351

A WORKING PLAN
FOR THE GHAT FORESTS
OF THE PALGHAT DIVISION

BY

T. V. VENKATESWARA AYYAR, M.A.
(Madras Forest Service)

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INTRODUCTION

The Chenat Nair Forest escheated to Government as long ago as 1790 and has been worked more or less continuously ever since that time. Though the necessity for preparing a working plan for it must have been recognized years ago, it was not until the forest had been heavily damaged by American 'logging' methods introduced in 1923–24 that the matter was taken up in earnest. Mr. E. A. Lasrado was then directed in 1928 to prepare a scheme for the treatment of damaged areas.

Early in 1929 the writer was posted to Palghat primarily with a view "to devise some cheap and simple means of helping Nature to recover from the wounds inflicted upon her at Chenat Nair." Field work was commenced in January 1929 and the areas in the Chenat Nair Reserve suitable for planting with teak were demarcated. Meanwhile Mr. Lasrado's scheme was approved tentatively in 1929 pending the preparation of the present plan.

The extraction of sleepers and kolmarams (scantlings suitable for cart shafts) from the evergreen (tropical rain-forests) forests of the Silent Valley Reserve had commenced in 1928–29 and promised to be a paying proposition. It was therefore decided that a plan for working this type of forest and all other areas in the Palghat division not then covered by any working plan should be taken up along with the one for the Chenat Nair 'logged' areas.

Enumeration and stock-mapping were accordingly started in the Silent Valley in the cold season of 1929 and were completed in March 1932.

The following Rangers worked under the Working Plans Officer ; the first four in the field work and the last one in compilation and checking of figures :—

Ranger P. M. Mathew.
,, N. S. Ayanna.
,, T. P. Gownder.
Ranger A. N. Ponniah.
,, A. Joseph.

A number of Foresters, varying from four to twenty-eight at different times, were engaged on enumeration work.

Ranger P. M. Mathew was with the staff from the commencement of enumeration to its completion. He fell ill of typhoid fever soon after and succumbed to it. His death before the compilation of enumeration statistics was a handicap. His ability and devotion to duty deserve to be placed on record.

Most of the statistics relating to past yield, past revenue and expenditure and prices were furnished by the District Forest Officer, Palghat, and the Forest Engineer, Coimbatore. The maps were prepared by Draftsman K. P. Damodaran of the North Mangalore Forest Division.

The Working Plans Officer would take this opportunity of thanking the officers and subordinates of the Palghat Forest Division and the Forest Engineering Division for their co-operation and assistance, both in the field and in the collection of statistics relating to past working of the forests.

Palghat,
16*th November* 1932.

T. V. VENKATESWARA AYYAR,
Working Plans Officer.

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A WORKING PLAN ~~OF~~ FOR THE GHAT FORESTS OF THE PALGHAT DIVISION.

PART I

Summary of Facts on which the Proposals are Based.

CHAPTER I.—THE TRACT DEALT WITH.

SECTION 1.—NAME AND SITUATION.

1. This working plan covers the whole of the Mannarghat Range and parts of the Palghat and Bolampatty Ranges of the Palghat Forest Division. With the exception of 3,374 acres of shola (tropical evergreen) forest jutting eastwards into the Coimbatore district, the area lies entirely in the Malabar district.

2. The tract dealt with falls between north-latitudes 10° 48′ and 11° 12′ 30″ and east-longitudes 76° 22′ 30″ and 76° 45′. It comprises some of the reserved forests situated at the southern extremity of the Western Ghats, to the north of the Palghat gap, and extends up to the Nilgiri district. The whole area is within the Palghat, Ernad and Walavanad taluks of the Malabar district and the Coimbatore taluk of the Coimbatore district.

SECTION 2.—CONFIGURATION OF THE GROUND.

3. With the exception of the small outlying reserves situated in the plains, and the lower slopes of the Chenat Nair Reserve, the area lies at elevations varying between 1,500 feet and 7,500 feet above mean sea level. The highest peak is Anginda, 7,817 feet at the north-east corner of the Silent Valley Reserve.

4. The following blocks will be considered separately for describing the configuration of the ground :—

(*a*) The Silent Valley Reserve,
(*b*) The Attapadi Blocks I to V,
(*c*) The Attapadi Block VI,
(*d*) The Chenat Nair Reserve, and
(*e*) Bolampatti Block II (Part).

5. (*a*) *The Silent Valley Reserve.*—This reserve lies entirely on a plateau to the north of Mannarghat, the outer slopes of the hills forming the tableland being private forest. The main basin of the Kundipuzha, which runs from north to south and empties its waters into the Bharatapuzha, is covered by these forests. The lowest point on the plateau is 2,250 feet on the southern boundary, where the Kundipuzha rushes down the ghats in a series of rapids. The western edge of the plateau rises gradually from 3,696 feet at Vannamparai on the south-west corner, to 3,818 feet at Chermankomban and 4,084 feet at Valiamullumalai, and culminates at Koyipara, 6,247 feet, on the north-west corner. To the east of the Kundipuzha, the watershed separating the Bhavani and the Kundipuzha drainage systems starts at Aruvampara in the south (3,812 feet) and progressively rises northwards to an elevation of 7,817 feet in the Anginda peak on the Nilgiri boundary, the highest point in the tract dealt with. The western slopes of this range drain into the Kundipuzha in a series of parallel valleys running east to west and are characterized by extensive grassy blanks. Below an elevation of 4,500 feet they support good shola, but above this the vegetation degenerates into a short stunted type and the hillsides become rocky and precipitous as a result of the extensive denudation caused by the full force and the heavy downpour of the south-west monsoon. Poochipara bungalow, on the grassy slopes of the Kanjikomban peak, commands a wonderful view of the whole reserve and it is no exaggeration to assert that there are few landscapes in the south of India which can equal it in sheer beauty.

6. (*b*) *The Attapadi Blocks I to V.*—These together form the catchment area of the source of the Bhavani River, which flows eastwards into the Coimbatore district to join the Cauvery. The Bhavani takes its source in the Kundahs of the Nilgiris and flows almost due south and parallel to the Kundipuzha, bordered on either bank by the hills which form the reserves, until it turns sharply eastwards at the south-west corner of the Attapadi Block V, where it is joined by the Panthanthodu.

The western boundary of this block is the crest of the range of hills to the east of the Silent Valley Reserve, forming its eastern boundary. The lowest point is 1,750 feet, at which place the Bhavani decides against entering rain-sodden Malabar and turns sharply eastwards to quench the dry plains of the Carnatic. Private enterprise appears to have made an abortive attempt, years ago, to invite her to Malabar, for the remains of a canal may still be seen here. The hills rise rapidly northwards where they go up to over 7,300 feet, on the Nilgiri boundary.

To the east of the Bhavani the ridge rises almost precipitously from the river at Mukkalivangai (1,750 feet) to Malleswaramalai, a needle-shaped rock 5,458 feet above sea-level. It then runs northwards in a series of sharp, rocky, precipitous escarpments to 7,300 feet on the Nilgiri boundary. Grass and unclothed rock-massifs are characteristic of the eastern slopes of this ridge and sholas persist only in a degraded form in a few protected pockets.

7. (*c*) *The Attapadi Block VI.*—This detached block protects the head waters of the Siruvani, a tributary of the Bhavani. It is a plateau varying in elevation between 2,000 feet and 4,000 feet, and is situated beyond the highest range of hills to the north of the Chenat Nair reserve. The slopes to the east drain into the Coimbatore district and those to the west into the Malabar district, but the whole of the plateau constituting the reserve drains only into the Siruvani, which flows northwards.

To the south, the hills rise steeply to form the bare, precipitous slopes of Elivalmalai (6,650 feet) the main ridge of which runs east to west. The highest peak is 6,774 feet. On the west is Vellingiri peak, 5,907 feet, a prominent landmark from Coimbatore town. The general configuration is undulating, with hills and valleys well clothed with vegetation, but for the large grassy area round Muthikulam, to the south-east, and the mass of high hills to the south.

8. (*d*) *The Chenat Nair Reserve.*—This is situated on the southern extremity of the western ghats ending at the Palghat gap and is, at its nearest point, only five miles from the railway station of Olavakkot. The main ridge, 3,000 feet to 5,000 feet in elevation, runs from east to west but is cut up by numerous lateral spurs. The drainage is partly to the south, through the Karimpuzha and the Sappalthodu, and partly westwards along the Minpallampuzha which drains the Kalladikode Valley.

The elevation rises from 300 feet at the reserve boundary on the south, to the top of Palamalai 5,700 feet. The slopes above an elevation of 3,000 feet are clothed with grass only and the ridges are rocky and precipitous.

9. (*e*) *Bolampatti Block II.*—Only the shola portion of this reserve is dealt with under this Working Plan. The shola covers the eastern slopes of the easternmost ridge of the ghats and adjoins Attapadi Block VI on its north-eastern corner.

The main ridge falls from Vellingiri peak, 5,907 feet at the southern extremity, to Thumbemalai 4,996 feet, Kuppadakal 4,850 feet and Varadimudi 5,000, feet northwards.

The ridges are bare for some distance, but the gentle eastward slopes support a second-class shola down to an elevation of about 3,750 feet. The shola feeds a number of perennial tributaries of the Noyil Ar, an important source of irrigation in the Coimbatore district.

SECTION 3.—GEOLOGY, ROCK AND SOIL.

10. The rock formation is of Archæan age and consists principally of Nilgiri gneiss and its metamorphic variations. The gneiss is finely foliated and is composed of quartz, felspar and biotite (black mica) with an occasional admixture of garnet, which may sometimes be collected from river-beds after a heavy flood. (The writer has seen some garnet picked up from the Kalpathi river by the local inhabitants.) The felspar is often in the form of large crystals which then give the appearance of porphyry to the gneiss. Large crystal masses of felspar, resulting from the partial disintegration of gneiss, are met with in the Chenat Nair reserve.

11. The gneiss has undergone metamorphism in different ways during the lapse of time. Veins of quartz are not uncommon and some quartzite is also prevalent. But a striking feature is the complete dissolution of the cementing material in certain localities where a schistose rock originally formed the subsoil foundation, leaving the constituents

in situ, so that the rock, which has disintegrated almost into loose sand, still exhibits its original foliations and simulates a solid appearance, but crumbles into powdered sand at a touch. In fact, the gneiss had been metamorphosed into a schist, the important constituent of which is hornblende and this disintegrates with ease. This interesting phenomenon, probably the result of heavy rainfall soaking into the soil and dissolving out the cementing material, may be observed in road-cuttings in the Chenat Nair reserve and in Attapadi Block VI.

12. Another form of metamorphism, which has been ascribed to monsoon conditions repeated through the ages, changes the gneiss into laterite, which may be met with in its pure form in the foot-hills. Laterite is a ferruginous, red, soft rock, with irregular galleries filled with yellow clay running through its mass, and it has the property of hardening on exposure to the air. It usually supports a comparatively shallow layer of soil over it, so that a sub-soil cap of laterite is unsuitable for the growth of certain species, teak in particular.

13. Though laterite in its pure form is not met with on the hills, the rocks do undergo a change akin to lateritic metamorphosis, which results in the formation of a ferruginous, argillaceous soil, varying from pale yellow to red in colour. This is the soil on which a shola type of forest is found usually to thrive, and to thrive best, when it is fairly deep and well drained. In depressions where this clayey loam tends to accumulate owing to rainwash, marshy conditions are apt to prevail and in such places certain species grow often to the exclusion of others.

14. The protective function of tree-growth over the surface soil on these high hills with a heavy rainfall, is well exhibited by the very large number of landslips which may be observed on all grassy slopes. These slips are rare on tree-clad slopes, though certainly more common in the adjoining private forests subject to heavy and indiscriminate fellings.

SECTION 4.—CLIMATE.

15. *General.*—The considerable difference in elevation between the plains and the ghats makes for appreciable variations in their climatic conditions.

The maximum and minimum shade temperatures in the plains are in the neighbourhood of 105° F and 70° F. On the hills, these may be 90°F and 50°F, respectively, varying somewhat with the altitude.

The plains are hot and humid, though fairly equable. The hills are cooler and drier and afford a pleasant retreat during the hot months.

March, April and May, the hottest months, are unhealthy owing to the virulence of malaria. Sappal and Dhoni in the Chenat Nair reserve, Muthikulam in Attapadi Block VI and Chindaki in the Attapadi valley, are notoriously feverish. The Silent Valley reserve was free from malaria for some time after fellings were started in it during 1928, but malarial germs have infected the mosquitoes through the vast number of sawyers who have carried the fever with them from elsewhere, so that the valley is rapidly becoming malarial. There is not much danger of its ever becoming really bad, since the light fellings prescribed in this plan will not open up the forests sufficiently to allow the *Anophelines* to thrive.

16. *Winds.*—The prevailing winds are from the west and south-west during April to September, and from the east and north-east from October to March.

The western sea-breeze blows lightly in the evenings from the month of March onwards, developing into the South-west monsoon about the beginning of June.

The dry east-wind blows strongly from November to March, starting early in the morning and blowing till past noon. It dries the forests and causes a rapid spread of forest fires.

Thunderstorms are frequent in April and May : they reduce the danger from fire and favour the germination of seed though they may interfere with the burning of slash in regeneration areas.

17. *The Monsoons.*—The South-west monsoon, which precipitates the major part of the annual rainfall, bursts usually in the beginning of June. The heaviest falls are in July and August. The seed-fall for most of the important timber trees, like teak and rosewood (*Dalbergia latifolia*) in the deciduous zone and *Mesua ferrea* and *Palaquium ellipticum* in the sholas, is timed to take full advantage of this monsoon and occurs from March to June. The prevailing fairly high temperature, combined with the abundant rainfall during the growing season, engenders a moist heat which favours luxuriance of vegetation and the maintenance of conditions peculiarly suited to the growth of the 'tropical rain-forest,', generally known as 'shola.' It is needless to add that the conditions favour weed-growth as much as they do a forest crop.

The North-east monsoon brings some rain in October and November and tends to prolong the season of growth.

Between December and March scarcely any rain falls in the plains and on the outer hills, but the sholas often catch a few showers during these dry months, situated as they are at a higher elevation.

18. *Rainfall.*—The average annual rainfall in the plains is about 100 inches. It is more on the hills, increasing as the higher altitudes are reached, but diminishes gradually eastwards. The first high hills catch the heaviest rainfall, which diminishes progressively as the clouds cross over successive ranges. This is very evident in the nature of the vegetation that successive valleys support and in the elevation at which certain species occur. For example, the privately owned western slopes of the ridge that bounds the Silent Valley to the west, the first high hills to catch the monsoon clouds, are covered with sholas (at present under the process of destruction) right down to an elevation of about a thousand feet. The Silent Valley does not support a shola type below an elevation of 3,000 feet, while the next parallel valley of the Bhavani (Attapadi) is drier still, with sholas of a poorer type. The eastern slopes of the last high range of hills on the left banks of the Bhavani support a poor type of shola above 3,750 feet, while below this only deciduous forests thrive.

The Silent Valley Reserve and the Kalladikode valley of the Chenat Nair Reserve receive the highest rainfall in the tract dealt with, the former because it is situated just behind the first high range of the ghats, while the latter valley faces due west and has the Palamalai hill, 5,700 feet, at its head. The Kalladikode valley is so moist that leeches thrive at the foot of the hills, scarcely 300 feet above the sea. A specimen of *Palaquium ellipticum* has been observed to grow at the foot of this valley, a species that in this locality usually affects altitudes above 2,000 feet.

19. Tables showing the monthly rainfall at Dhoni, (at the foot of the Chenat Nair hills) at Sappal ridge, 1,000 feet, in the Chenat Nair Reserve, at Mannarghat and Palghat on the plains, at Nilikal, 3,200 feet, at the South end of the Silent Valley, and at Muthikulam, 3,000 feet, to the extreme east of the Attapadi Block VI, are given below :—

Statement showing monthly rainfall at Dhoni in inches.

Month.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	Average rainfall for 1914–1921
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
January	..	..	0·80	..	..	..	0·12	..	..	0·11
February	..	..	1·60	..	..	..	..	..	..	0·20
March	..	0·80	2·00	..	0·60	2·20	0·48	4·40	..	1·31
April	..	0·80	3·20	1·60	..	0·20	2·40	4·02	6·40	2·33
May	..	2·80	7·20	9·20	17·60	12·00	10·40	3·00	3·80	8·25
June	..	15·00	28·40	33·60	21·00	15·00	28·00	29·60	18·20	23·60
July	28·00	39·20	37·20	19·60	11·60	9·20	11·60	34·95	47·80	26·39
August	12·00	13·60	14·80	11·60	13·00	15·50	23·40	6·80	26·80	15·69
September	..	11·20	20·80	14·00	33·20	7·92	6·12	8·80	5·20	13·40
October	21·78	8·80	4·80	6·40	8·00	4·16	12·00	5·90	13·00	7·88
November	..	2·00	10·40	4·40	9·20	8·00	12·00	3·40	..	6·17
December	2·60	0·80	..	..	7·20	0·06	0·40	..	..	1·06
Total ..	**64·38**	**95·00**	**131·20**	**100·40**	**121·40**	**74·24**	**106·92**	**100·87**	**121·20**	**106·39**

Statement showing monthly rainfall at Sappal in inches.

Month.	1923.	1924.	1925.	1926.	1927.	1928.	1929.	1930.	1931.	Average rainfall from 1923 to 1931.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	10)	(11)
January	5·80	..	..	0·40	..	..	..	..	..	0·69
February	0·30	..	..	..	..	..	..	..	..	0·03
March	1·40	1·10	3·28	..	1·00	..	..	..	..	0·75
April	..	..	3·80	1·80	1·10	..	..	..	..	0·74
May	1·40	6·40	6·00	5·60	4·20	0·60	..	0·30	4·00	3·17
June	18·40	40·84	28·80	17·60	28·00	15·80	18·40	26·00	24·00	24·20
July	58·40	90·32	42·20	49·52	10·00	22·40	42·80	25·20	20·80	40·18
August	44·00	29·52	27·40	33·40	18·00	42·80	16·40	5·60	49·60	29·63
September	6·60	19·16	18·32	15·00	12·40	4·00	17·60	26·80	6·00	13·98
October	10·80	11·16	9·68	9·20	7·20	4·60	7·60	26·80	11·20	10·91
November	..	10·00	3·28	2·10	12·00	1·80	0·20	16·80	5·20	5·71
December	..	..	1·20	..	..	0·20	0·20	1·20	2·80	0·62
Total ..	**147·10**	**208·50**	**143·96**	**134·62**	**93·90**	**92·20**	**103·20**	**128·70**	**123·60**	**130·60**

Note.—Between 1922 and 1927 the gauge was in charge of the Forest Exploitation Division. No records are available for 1922.

Statement showing monthly rainfall at Neelikal in inches.

Month. (1)	1927. (2)	1928. (3)	1929. (4)	1930. (5)	1931. (6)	Average rainfall for 1927 and 1931. (7)
January	..	..	..	..	0·09	0·04
February	..	1·22	0·10	..	0·02	0·01
March	..	2·67	0·30	0·20	0·62	0·31
April	1·23	2·73	7·63	0·25	1·47	1·35
May	11·79	4·20	3·14	19·00	5·93	8·86
June	40·69	21·33	9·04	18·83	56·05	48·37
July	93·51	23·39	13·30	29·20	53·16	73·33
August	30·92	30·85	17·91	25·21	107·11	69·01
September	37·96	7·82	12·89	31·53	9·93	23·94
October	2·70	18·84	18·26	21·33	18·76	10·73
November	10·09	5·08	4·35	9·75	13·46	11·77
December	..	..	0·45	2·12	3·09	1·54
Total ..	228·89	118·13	87·37	157·42	269·69	249·26

Note.—The figures for 1928 to 1930 are not reliable.

Statement showing average monthly rainfall at Palghat and Mannarghat in inches—(1870—1930).

Month. (1)	Palghat. (2)	Mannarghat. (3)	Month. (1)	Palghat. (2)	Mannarghat. (3)
January	0·23	0·20	August	12·30	17·19
February	0·34	0·32	September	6·03	8·96
March	0·91	1·33	October	8·07	13·04
April	2·60	3·69	November	3·97	6·67
May	4·84	6·24	December	0·88	1·85
June	17·19	23·96			
July	22·33	37·78	Total ..	79·69	121·23

Statement showing monthly rainfall at Muthikulam in inches.

Month. (1)	1927. (2)	1928. (3)	1929. (4)	Average rainfal for 1928 and 1929. (5)	Month. (1)	1927. (2)	1928. (3)	1929. (4)	Average rainfal for 1928 and 1929. (5)
January ..	..	0·41	0·59	0·50	September ..	..	2·00	8·33	5·16
February ..	..	3·19	3·33	3·26	October ..	..	12·30	10·10	11·20
March ..	..	1·22	0.10	0·66	November ..	5·68	5·34	2 93	4·13
April ..	..	2·93	8·96	5·94	December ..	1·97	2·97	..	1·48
May ..	..	1·76	2·94	2·35					
June ..	..	13·65	32·20	22·92	Total ..	7·65	86·02	116·48	101·22
July ..	..	21·36	34·62	27·99					
August ..	..	18·89	12·38	15·63					

20. The rainfall at the northern end of the Silent Valley is estimated to be considerably higher than that recorded at Nilikal and is probably above 300 inches per annum, and the same may be said of the Kalladikode valley.

SECTION 5.—WATER-SUPPLY.

21. With such a heavy rainfall, many of the streams may be expected to be perennial. The following important rivers and larger streams are perennial and there are many smaller ones as well :—

Chenat Nair Reserve.

1. Karimpuzha,
2. Sappal Thodu,
3 Plakattampalli Thodu,
4. Poliampalli Thodu, and
5 Minpallam puzha.

Silent Valley Reserve.

6. The Kundipuzha and its main tributaries.

Attapadi Blocks I to V.

7. The Bhavani and its main tributaries.

Attapadi Block VI.

8. The Siruvani River,
9. The Pambar, and
10. Pothuparapallam.

Bolampatti Block II.

11. Kanavarai stream and
12. Walmukkai stream.

22. All the forest rest-houses, except the one at Dhoni, find their water-supply in neighbouring perennial springs, and those at Sappal and Palamalai have pipe lines laid on from streams. A well supplies the Dhoni bungalow. There is therefore no dearth of water at any of the important camps.

SECTION 6.—DISTRIBUTION AND AREA.

23. The following reserves in the ranges shewn, come under this plan :—

Range. (1)	Name of Reserve. (2)	Area as given in Section 16 notification, in acres. (3)	Area as in Survey of India map, in acres. (4)
Palghat	1 Chenat Nair	15,202·78	15,272·00
	2 Dhoni	46·77	39·15
	3 Puliampalli tope	19·74	21·00
	4 Thampurattipottai and addition	131·63	130·03
Mannarghat	5 Attapadi Block I.	18,560·00	18,883·00
	6 Attapadi Blocks II to IV	2,880·00	2,891·00
	7 Attapadi Block V.	13,160·00	13,888·00
	8 Silent Valley	22,120·00	22,120·00
	9 Panakadan with Extension I	1,106·13	1,088·13
	10 Panakadan Extension II (Kottanikunnu)	125·80	125·80 Not surveyed by the Survey of India.
Bolampatti	11 Attapadi Block VI	15,780·00	15,848·00
	12 Part of Bolampatti Block II (shola)	3,374·00	3,374·00 (computed by planimeter).
	Grand total	**92,506·85**	**93,680·00**

This gives a total area of 93,680 acres or about 146 square miles.

24. An area of 3,374 acres of shola forest adjoining Attapadi Block VI, and situated on the higher slopes of Bolampatti Block II, has as shown above, been included in this plan. It is of too small an extent to justify a separate working plan, it forms a convenient adjunct to the main shola in Attapadi Block VI and is suitable for exploitation on the same lines. It forms part of Compartment 28 of the Bolampatti Working Plan, under which no work in it has been prescribed, so that it will be expunged from that plan as soon as this comes into operation.

SECTION 7.—STATE OF THE BOUNDARIES.

25. The boundaries of the reserves are partly natural and partly artificial.

The Chenat Nair Reserved Forest.—The boundaries are cleared lines 12 feet wide, except on the east and part of the north, where the Karimpuzha forms a natural boundary. Stone cairns 4 feet high and 3½ feet in diameter have been erected at intervals, each cairn carrying a wooden post at its top, with an arrow-mark, the letters 'R.F.' and a consecutive number painted in tar. On lines bordering the plains a trench often runs between cairns. The cleared boundaries are treated as firelines even where they pass through sholas, so that the boundaries are being kept in good order.

26. *Dhoni, Puliampalli tope, Thampurattipottai, Panakadan and Kottanikunnu reserved forests.*—The boundaries of all these minor reserves are cleared lines 12 to 15 feet broad, with stone cairns at intervals and turning points, and are all in good order. The boundary of Panakadan reserve has been lockspitted wherever it adjoins fields.

27. *The Silent Valley Reserve.*—The outer boundary of this reserve, bordering on private forests on the south and the west, has been demarcated by a cleared line 20 feet wide, with stone cairns 4 feet square and 2 feet high. It is being firetraced annually where it passes through the deciduous zones or grass land, but the portions passing through sholas are often recognizable with difficulty owing to rank growth of reeds and other weeds.

Considerable discrepancy between the boundary as it exists on the ground and as is represented on the Survey of India maps, has been noticed in more than one place. The notification under Section 16 of the Madras Forest Act declaring the Silent Valley forest as Reserved Forest, did not define the boundary with great accuracy, so that differences have crept in when the outer boundary was demarcated in 1927–28 under the orders of the District Forest Officer. Where the discrepancies were noticed by the writer the boundary as cut and demarcated in 1927–28 has been marked approximately on the Survey of India maps. An early verification of this outer boundary is necessary and is prescribed in paragraph 705 below.

The northern and eastern boundaries adjoin other reserved forests and are formed by distinct natural features. On the north the boundary runs along a high ridge from Koyipara (6,247 feet) to Sisparabetta (7,237 feet) and thence to Anginda (7,817 feet). The eastern boundary is the ridge separating it from Attapadi Block I. These need no attention or maintenance.

28. *Attapadi Block I.*—The southern outer boundary of this reserve is a continuation of that of the Silent valley and is a cleared line 20 feet wide separating it from the private forests, with short stone cairns at intervals. All of it is clear as it is being fire-traced annually, but discrepancies between the existing boundary and that marked on the Survey of India maps have been observed on this line, in the Panthanthodu valley. These have been marked approximately on the maps and should be verified along with the boundary of the Silent valley reserve, as prescribed in paragraph 705 below.

The northern boundary forms the edge of the Nilgiri plateau, and divides it from the Kundahs reserve ; to the east is the Bhavani river, and the west is the ridge separating it from the Silent Valley.

29. *Attapadi Blocks II to V.*—The western and southern sides of this block of reserves are bounded by the Bhavani river. The eastern boundary is a cut line 20 feet wide, fire-traced annually ; to the north is the Kundahs reserve. No discrepancies were observed.

30. *Attapadi Block VI.*—The north, west and south of this block border private forests and are demarcated by cut lines 12 feet broad and stone cairns. The eastern boundary, indicated by cut lines, adjoins Bolampatti Block II and is being fire-traced annually, as part of that reserve.

The out line indicating its southern boundary runs along the ridge of a high range of hills, from Patiyamukkom malai, 5,552 feet, to Elival malai, 6,650 feet, and on to Periakunjira malai, 6,550 feet. This does not require any attention. The northern and western boundaries run all through sholas and are therefore not being fire-traced. Portions have become so heavily overgrown that it is often difficult to identify the boundary. They must be kept clear, as prescribed in paragraph 705 below.

The northern boundary is not in accordance with the description found in the notification under section 16 of the Madras Forest Act.

SECTION 8.—LEGAL POSITION.

31. The reserved forests dealt with herein have been notified under Section 16 of the Madras Forest Act, as set out in the following table :—

Name of reserve.	Area in acres.	Date of reservation.	Particulars of notification legalizing reservation.	Remarks.
(1)	(2)	(3)	(4)	(5)
1 Chenat Nair ..	15,202·78	1st Apr. 1887..	Section 16, notification No. 158, dated 1st April 1887, at page 276 of part I of the *Fort St. George Gazette,* dated 5th April 1887. Amended boundary description published at pages 1343 to 1346 of Part I of the *Fort St. George Gazette,* dated 5th December 1922. Notification No. 343, dated 1st December 1922.	Acquired by escheat.
2 Dhoni alias Plakattampalli paramba.	44·93	31st July 1897.	Notification No. 209, dated 14th May 1897, page 613 of Part I of the Gazette, dated 18th May 1897.	
3 Dhoni Extension I.	1·15	15th Sep. 1919.	Notification No. 300 of 22nd July 1919, published on page 960 of Part I of the Gazette, dated 29th July 1919.	
Dhoni, *alias* Plataktampalli paramba.	45·62	..	Amended boundary description of Dhoni reserve published in Notification No. 25 of 21st January 1921.	Correct area in lieu of 44·93.
4 Thampurattipottai, *alias* Pillacheripallam.	123·60	31st July 1897.	Notification No. 209 of 14th May 1897 on page 613 of Part I of the Gazette, dated 18th May 1897.	
5 Thampurattipottai addition.	8·03	25th Jan. 1921.	Notification No. 363, dated 29th November 1920 in Part I of the Gazette, dated 7th December 1930.	Paddy fields.

Name of reserve. (1)	Area in acres. (2)	Date of reservation. (3)	Particulars of notification legalizing reservation. (4)	Remarks. (5)
6 Puliampalli tope ..	19·74	31st July 1897.	Notification No. 209 of 14th May 1897 mentioned above.	
7 Silent Valley ..	22,120·00	1st July 1914.	Notification No. 291 of 18th May 1914 on page 823 of Part I of the Gazette, dated 9th June 1914.	785·75 acres in Walluvanad taluk acquired for Rupees 743–6–5.
8 Panakadan.. ..	1,104·00	15th Oct. 1906.	Notification No. 338 of 27th July 1906 on page 831 of the Gazette, dated 7th August 1906.	
9 Panakadan Addition I.	2·13	1st Apr. 1918	Notification No. 61-S of 11th February 1918, approved in G.O. No. 568, Revenue, dated 11th February 1918.	
10 Panakadan Addition II *alias* Kottanikunnu.	125·80	15th Nov. 1918.	Notification No. 59, dated 24th September 1918, on page 980 of Part I of the Gazette, dated 24th September 1918.	
11 Attapadi Block I ..	18,560·00	1st Sep. 1900.	Notification No. 332 of 13th July 1900 on page 1085 of the Gazette, dated 17th July 1900.	
12 Do. II. 13 Do III. 14 Do. IV.	2,880·00	Do.	Do.	
15 Do. V.	13,160·00	1st Sep. 1912.	Notification No. 314, dated 22nd June 1912, on page 696 of Part I of the Gazette, dated 9th July 1912.	Acquired under the Land Acquisition Act for Rupees 11,379–4–0.
16 Do. VI.	15,780·00	Do.	Do.	Acquired under the Land Acquisition Act for Rupees 91,571–12–0.
17 Bolampatti Block II.	26,318·80	1884 ..	Please see page 3 of Working Plan for Bolampatti valley forests.	Only the shola, at the top, is included in this plan. Area included is 3,374 acres.

SECTION 9.—RIGHTS AND CONCESSIONS.

32. All the reserves are the absolute property of the State and none is encumbered with any rights of importance.

33. The following reserves are entirely free of all rights :—

1 Attapadi Block I.
2 Do. II.
3 Do. III.
4 Do. V.
5 Do. V.
6 Attapadi Block VI.
7 The Silent Valley.
8 Puliampalli tope.
9 Dhoni and its addition.

34. *Rights.*—The rights admitted in the following reserves are either rights of way, private or public, or rights to divert water from hill-streams by channels and dams and to repair them without injury to the growth :—

1 Chenat Nair.
2 Thampurattipottai and addition.
3 Panakadan and additions.
4 Bolampatti Block II.

All the rights admitted are given in detail in Appendix I.

35. *Concessions.*—At the settlement of the Attapadi reserves it was stated that the jungle tribes residing therein could not be said to have any claim to easement or proprietary right over the sites of their temporary residence. "They will be permitted by the Forest Department to continue their cultivation under that department in the interest of the department, which requires that the valley shall be inhabited by men, who can collect the minor produce and who, if looked after and prevented from destroying sholai growth, are useful in many ways."

36. Accordingly, the people of the following villages were permitted to reside within the reserved forests :—

Attapadi Block I	Thadikundu, Anavoy.
Do. III	Murigalai.
Do. V	Todiki, Kadukumanna, Gottiakhandi and Kurukattikallu.
Do. VI	Muthikulam.

They have permanent village sites and are tenants-at-will of the Forest department. Till about 1917 there was very little check over their "kumri" (shifting) cultivation. From that year onwards, definite areas of land, free of assessment, were leased to them for cultivation, on the headmen executing agreements, in return for their supplying men at usual market rates for carrying the kit of touring officers and for forest work.

37. In 1919, the sanction of the Board of Revenue was obtained for areas to be leased to each village in excess of 25 acres.

38. In 1921–22, during the slackness in administration consequent on the Mappilla rebellion, the settlements cleared and cultivated land outside the areas allotted to them.

39. Attempts were made soon after to make the lessees to plant the cultivated area with teak, *Artocarpus hirsuta, Xylia xylocarpa,* etc., but this ended in failure for want of proper supervision.

40. In 1927, a scheme for cultivating the lands on a four-year rotation was brought into effect, under which : (1) each village was definitely allotted three blocks of forest near the village-site, the area in acres of each block being about twice the number of families in the village, plus 6 acres for the headman ; the three blocks of each village were demarcated and surveyed, (2) the lease was to be renewed every year, (3) of the three blocks in a village, each block was to be cultivated for two years, and the other two were to lie fallow ; the first block was to be cultivated again in the fifth year after the temporary abandonment, (4) the moopan (headman) and others in the settlements be bound to supply labour to the department, at market rates, and to assist in forest conservation, (5) in return for which the lease would be free of assessment.

The extent of land so allotted for each settlement was—

Village.	Land in acres.	Village.	Land in acres.
Thadikundu	106·0	Todiki	126·0
Anavoy	48·0	Kadukumanna	55·0
Murigalai	90·0	Muthikulam	80·35
Gottiakhandi	45·0	Sundanari	114·0
Kurukattikallu	42·0		

Inspection has shown that the regrowth at the end of four years is not sufficiently luxuriant to bring the land again under "kumri."

41. The villagers own some cattle and graze them within the reserves as a concession.

42. Proposals for regularizing the keeping and grazing of cattle and for increasing the rotation for "kumri" will be found in Chapter IX of Part II (Miscellaneous Regulations).

CHAPTER II.—THE FOREST.

SECTION 1.—COMPOSITION AND CONDITION OF THE CROP.

43. The forests covered by this working plan fall under three main types—

Sadivayal } (a) The deciduous "monsoon forest," Southern Tropical Moist deciduous Forests

(b) The evergreen "tropical rain forest" locally called "shola," and 'Tropical Wet Evergreen Forest

Matticulam } (c) The sub-tropical evergreen forest. Southern Wet Temperate Forests

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Intermediate types, such as a semi-evergreen type between (*a*) and (*b*) and a sub-tropical rain-forest type between (*b*) and (*c*) can of course be recognized.

(a) The "monsoon forest."

44. According to Schimper, "monsoon forest" occurs in regions where the rainfall exceeds 70″ but where there is a prolonged dry season during which the forest is more or less leafless. The monsoon forest differs from the usual dry-deciduous type found in the Peninsula mainly in the greater height and girth growth of its trees. Though there are

some species which are peculiar to this type of forests, such as *Tetrameles nudiflora*, *Terminalia paniculata* and *Artocarpus hirsuta*, most species are common to both types. Woody climbers and herbaceous epiphytes are more prevalent in the monsoon forest than in the "dry-deciduous."

45. This type of forest rises from the plains to elevations up to 800′ on westerly or southerly slopes. Where soil and moisture conditions are bad, on easterly slopes and where the forests were subject to shifting cultivation in the past, it may be met with up to 2,000′ or more.

46. The chief species that prevail are: *Xylia xylocarpa*, *Terminalia paniculata*, *Anogeissus latifolia*, *Grewia tiliæfolia*, *Lagerstrœmia lanceolata*, *Dalbergia latifolia*, *Artocarpus hirsuta*, *Albizzia odoratissima*, *Albizzia lebbek*, *Bombax malabaricum*, *Pterocarpus marsupium*, *Kydia calycina*, *Odina wodier*, *Wrightia tinctoria*, *Helicteres isora*, *Randia dumetorum*, *Schleichera trijuga*, *Terminalia tomentosa*, teak and bamboos (both *Dendrocalamus* and *Bambusa*).

47. The lower slopes of Chenat Nair reserve up to an elevation of about 800′, and the following reserves—Dhoni, Puliampalli tope, Thampurattipottai, Panakadan and Kottanikunnu (Panakadan Extension II)—all fall under this type.

48. The kumried slopes in Attapadi Blocks I to V, round Thadikundu, Murigalai, Chindaki, Sundanari and Gottiyakhandi, have also degenerated from a semi-deciduous type to a purely deciduous coppice regrowth. The total area under this type is approximately 7,000 acres.

49. (1) *The Chenat Nair, Dhoni and Puliampalli tope reserves.*—The southern slopes to the west of Sappal ridge have been largely worked in the past under the coppice with standards system and the present crop is the result of that system. *Albizzia procera* forms a considerable proportion of the standards. The area to the extrême west—Puliampalli slopes—was exploited for *Xylia* sleepers in 1929–30, so that no *Xylia* of considerable girth exists there at present.

There is no natural teak west of the Sappal ridge, nor any bamboos.

Old teak plantations exist in Dhoni reserve and Moochi tope. The whole of Puliampalli tope was planted with teak in 1919–20.

Part of the area is in the course of conversion into teak plantations and four coupes have already been planted. There are also two plantations of *Terminalia tomentosa* and several plantations of Mahogany, *Swietenia macrophylla*. Taken on the whole, the growth is comparatively poor.

The Elival valley, to the east of Sappal ridge, contains some natural teak, and is also full of bamboos. The bamboos have been flowering and dying in patches for the last four or five years, however.

The crop is of considerably better quality than that to the west of Sappal, and is particularly good to the north of Kalapara. The whole area was heavily "logged" by the Exploitation division in 1928–29 so that there is very little timber of any size in it now. *Grewia tiliæfolia* formed a high percentage of the old stand. This area is also in the process of conversion into teak plantations. One plantation was raised as long ago as 1919–20.

The lower slopes of Kalladikode valley, to the extreme west, contain a valuable growth of deciduous forest of good quality, with *Xylia xylocarpa*, *Artocarpus hirsuta*, *Grewia tiliæfolia*, and *Terminalia paniculata* particularly well represented. Bamboos and reeds thrive well. The area was worked under the selection system in 1930–31.

50. (2) *Thampurattipottai reserve.*—This is a small isolated reserve of about 130 acres, out of which about a fourth is sheet-rock. The rest is covered by a deciduous growth of poor quality, mainly coppice about ten years old, over which a few old teak standards are dotted about. Remnants of teak planted in 1919–20 also exist.

51. (3) *Panakadan and Kottanikunnu reserves.*—The Panakadan reserve supports a deciduous growth of fair quality below an elevation of about 750′, above which are rock-massifs. *Xylia xylocarpa*, *Lagerstrœmia lanceolata*, *Artocarpus hirsuta*, *Dalbergia latifolia*, *Pterocarpus marsupium* and *Terminalia paniculata* form the valuable species.

The Kottanikunnu reserve is best described as an open forest consisting mainly of large trees of *Schleichera trijuga*, with an undergrowth of *Xylia xylocarpa*, lantana, and thorny climbers like *Acacia pennata* and *Cæsalpinia mimosoides*.

52. (4) *Attapadi Blocks I to V.*—The areas kumried before reservation appear to have been a good type of deciduous forest, with *Dalbergia latifolia*, *Terminalia paniculata*, and *Terminalia tomentosa*, *Pterocarpus marsupium*, *Lagerstrœmia lanceolata*, *Chukrassia tabularis*, *Artocarpus hirsuta* and some teak, as the valuable species. At present the crop consists of coppice shoots 20–30 years old, resulting from past kumries, ranging down from a

foot in diameter. Except for a few large-sized teak and *Dalbergia latifolia* near Thadikundu and a few acres of unfelled forest in the extreme south, near Sundanari, there is no timber of exploitable dimensions in these old kumries. Special mention must be made of the *Dalbergia latifolia* which are particularly fine—trees up to 15′ in girth at breast height and a hundred feet high have been recorded during enumerations. Bamboos flowered and died over this locality some years ago, with the result that patches of thick undergrowth of young bamboo are met with in places. Throughout this type natural regeneration from seed is usually deficient, but coppice regeneration is quite satisfactory.

53. *The semi-deciduous sub-type.*—This sub-type prevails normally at elevations between 800′ to 2,000′, ascending up to 3,000′ on dry or rocky slopes.

It may be met with in the Chenat Nair reserve and in Attapadi Block I.

The deciduous species characteristic of this type are: *Acrocarpus fraxinifolius, Bischofia javanica, Chukrassia tabularis, Cedrela toona, Pterospermum rubiginosum, Holigarna arnottiana* and *Stereospermum xylocarpum*. The evergreens met with are: *Mangifera indica, Hopea parviflora* and *Hopea wightiana, Calophyllum elatum, Mesua ferrea* and *Hydnocarpus wightiana.*

The usual deciduous species, such as *Xylia xylocarpa, Lagerstroemia lanceolata, Terminalia paniculata, Dalbergia latifolia* and teak are also found.

A luxuriant growth of weeds, such as *Trema orientalis, Leea sambucina, Macaranga roxburghii, Clerodendron infortunatum,* and of the thorny climbers *Acacia pennata* and *concinna,* and *Cœsalpinia mimosoides,* tends to extinguish the growth of the seedlings of useful species even after establishment. Coppice shoots and root suckers, which are less liable to suppression, are a prominent feature.

54. In the Chenat Nair reserve this type prevails above the elevation of the Sappal ridge, in the Dhoni, Sappal and Elival valleys. They were all heavily "logged" between 1920 and 1929, when *all* useful timber above a girth of 3 feet was extracted, so that the crop at present consists of young poles, coppice, and hollow mature trees.

Attempts were made to plant up suitable areas with *Hopea parviflora, Artocarpus hirsuta* and various shola species (vide Chapter V). Plantations of the abovementioned species exist in the Dhoni valley (vide Chapter V, Part II for number and area).

Natural regeneration from seeds of *Hopea parviflora* and *wightiana, Acrocarpus fraxinifolius, Bischofia javanica, Lagerstrœmia lanceolata, Chukrassia tabularis* and *Cedrela toona,* is profuse in gaps created by fellings but suffers considerably from the weeds mentioned above. A patch of advance-growth of mixed *Hopea parviflora* and *Hopea wightiana* covering an area of about 536 acres, is a prominent feature in the Elival valley.

55. In Attapadi Block I, the area to the west of the Chindaki-Havelock's path, in the Ananganthodu valley, belongs to this type.

(*b*) *The Tropical rain-forest.*

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56. "The tropical rain forest formation is characterized by the great luxuriance of its vegetation, which consists of several tiers, the highest containing lofty trees, often with plank buttresses at the base, reaching a hundred and fifty feet or more in height, and the lowest containing dense, evergreen, shrubby undergrowth."

"A heavy rainfall, high atmospheric humidity, a short dry season, striking absence of gregariousness, trees with smooth bark sparingly branched, leaves often firm, leathery, or glossy, thick-stemmed climbers, climbing palms and woody or herbaceous epiphytes, are characteristic." (*Warming*).

The extracts quoted above are sufficiently descriptive of rain forest formations and apply generally to these forests, with such modifications as will be apparent from the descriptions of sub-types which follow.

57. The dominant first storey in this type of forest usually varies from a hundred to a hundred and fifty feet in height, and consists generally of: *Cullenia excelsa, Machilus macrantha, Elæocarpus tuberculatus, Elæocarpus munroii, Palaquium ellipticum, Mesua ferrea, Calophyllum elatum, Canarium strictum, Dysoxylum malabaricum, Vateria macrocarpa, Pœciloneuron indicum, Eugenia sp. Heritiera papilio, Chrysophyllum roxburghii, Mangifera indica, Artocarpus integrifolia, Polyalthea coffeoides, Cinnamomum zeylanicum, Holigarna arnottiana, H. grahamii, Meliosma arnottiana, Hopea glabra, Litsea wightiana, Mastixia arborea, Hemicyclea elata, Cyclostemon confertiflorus, Strombosia ceylanica* and *Filicium decipiens.*

58. In the second storey are usually present: *Myristica laurifolia, Hydnocarpus wightiana, Hydnocarpus alpina, Nephelium longana, Lansium anamalayanum, Garcinia spicata, Elæocarpus serratus, Adenochlœna indica, Gomphandra polymorpha, Gordonia obtusa,*

Eugenia sp., *Baccaurea courtallensis*, *Glochidion malabaricum*, *Canthium didymum*, *Litsea stocksii*, *Scolopia crenata*, *Xanthophyllum flavescens*, *Mappia fœtida* and *Actinodaphne hookeri*.

59. The shrubby third storey is represented by—*Euonymus angulatus*, *Agrostystachys indica*, *A. longifolia*, *Eugenia munroii*, *E. læta*, *Paramignya armata*, *Sauropus albicans*, *Leea sambucina*, *Saprosma fragrans*, *Webera sp.*, *Clerodendron infortunatum*, *Macaranga roxburghii*, *Strobilanthes sp.*, *Laportea crenulata*, *Olea dioica*, *Linocera malabarica*, *Callicarpa lanata*, *Pavetta zeylanica*, *Vernonia arborea*, *Lepisanthes deficiens*, *Turpinia malabarica*, *Orophea uniflora*, *Apama siliquosa*, *Sarcococca brevifolia* and *Croton scabiosus*.

60. The monocotyledons are represented by :—*Arenga wightii*, *Pinanga dicksonii*, *Calamus sp.*, *Pandanus furcatus*, *Ochlandra beddomei* (a reed) and harbaceous species like *Elettaria cardamomum*, the wild arrowroot and some of the *Aracæ*.

61. The climbers, which are not as abundant or as numerous as in semi-deciduous forests are represented by *Gnetum scandens*, *Calamus sp.*, *Smilax macrophylla*, *Elæagnus latifolia*, *Derris sp.*, *Entada scandens*, *Senecio araneosus*, *Thumbergia mysorensis*, *Paramignya armata*, *Luvunga eleutherandra*, *Morinda sp.*, and an epiphyte, *Fagrea obovata*.

62. Herbaceous ground flora are meagrely represented within the shola by cardamoms, *Curcuma sp.*, and *Heckeria subpeltata*.

It may thus be seen that the number of species is extraordinarily large, as is true of rain forests in general.

63. Other typical features are—Plank-buttresses exhibited by *Elæocarpus tuberculatus*, *Pœciloneuron indicum*, *Cullenia excelsa*, *Heritiera papilio*, *Palaquium ellipticum* and *Acrocarpus fraxinifolius*, prop roots by *Pœciloneuron indicum* and *Myristica laurifolia* ; and cauliflory strikingly manifested by *Polyalthea coffeoides*, *Artocarpus integrifolia*, *Baccaurea courtallensis*, and *Cullenia excelsa*, not to mention several species of *Ficus*.

Rain forest sub-types.

64. The several distinct plant communities that may be recognized within the main rain forest formation form an interesting and instructive study.

The tropical rain forest is acknowledged to be a climax formation, representing the farthest advance towards a hygrophilous type of vegetation that a locality is capable of supporting. In such a formation, the number of inhabiting species is very large, gregariousness is usually not prominent, and associations of a single dominant species are exceptional. Distinct associations of more than one dominant species or variations of such associations, however, have been recognized by Huber in the valley of the Amazon. Such associations may be caused by lack of competition due to edaphic factors, by changes in elevation, rainfall, or aspect or may be due to special conditions of regeneration of certain dominant species.

65. Eight distinct associations may be recognized as important within our rain forest formation :—

1 *The Cullenia-Palaquium association,*
2 *The Palaquium-Mesua association,*
3 *The Pœciloneuron-Palaquium association,*
4 *The Mesua-Calophyllum association,*
5 *The Vateria-Cullenia association,*
6 *The Mesua-Cullenia association,*
7 *The Reed-Calophyllum association, and*
8 *The Reed-Pœciloneuron association.*

66. (1) *The Cullenia-Palaquium association.*—This community, the dominant species of which are *Cullenia excelsa* and *Palaquium ellipticum*, is the most widespread of all the associations occurring within the area. It affects elevations between 2,500′ and 3,500′ and aspects with comparatively heavy rainfall, but does not tolerate swampy conditions, even of a temporary nature. It grows on deep well-drained soil, so that the dominants as well as the other associates are of the best quality.

67. The valuable species met with in this association are—*Palaquium ellipticum*, *Mesua ferrea* and *Calophyllum elatum*, *Cullenia* itself not being of much value.

68. Two different varieties of this association are met with, one in Attapadi Block VI, in which there is an appreciable admixture of *Vateria macrocarpa*, and the other over the rest of the division (The Silent Valley, Attapadi Block I and Chenat Nair) in which this species is conspicuously absent. In the *Vateria* variety, the incidence of *Mesua* is low, particularly in the higher diameter classes, and that of *Palaquium* is high in the lower diameter classes but low in the higher classes, compared with the *non-Vateria* variety.

69. Taking all trees above a breast height diameter of 12″, the average incidence per acre in the two varieties of this sub-type is as follows :—

Species.	Incidence per acre.	Species.	Incidence per arce.
Variety I (*Vateria*).			
1 *Palaquium ellipticum*	10·35	7 *Artocarpus integrifolia*	0·37
2 *Cullenia excelsa*	9·20	8 *Bischofia javanica*	0·33
3 *Mesua ferrea*	3·23	9 *Pœciloneuron indicum*	0·31
4 *Vateria macrocarpa*	2·30	10 *Aglaia sp.*	0·27
5 *Calophyllum elatum*	0·52	11 *Nephelium longana*	0·17
6 *Eugenia sp.*	0·49	12 *Dysoxylum malabaricum*	0·05
Variety II (*Non-Vateria*).			
1 *Cullenia excelsa*	6·72	7 *Eugenia sp.*	0·11
2 *Palaquium ellipticum*	4·83	8 *Bischofia javanica*	0·04
3 *Mesua ferrea*	3·88	9 *Dysoxylum malabaricum*	0·03
4 *Hopea glabra*	0·69	10 *Acrocarpus fraxinifolius*	0·02
5 *Calophyllum elatum*	0·63	11 *Cedrela toona*	0·01
6 *Artocarpus integrifolia*	0·29		

70. The sub-dominants and the undergrowth are in the main those detailed under the rain-forest formation. A more detailed study is likely to disclose affinities between the different associations and the sub-dominants or undergrowth under each ; an approach to the solution of the problem is indicated through the examination of the different species of *Strobilanthes* met with.

71. The *Cullenia-Palaquium* association prevails over the major part of Attapadi Block VI, and the Chenat Nair Reserves, and in the Panthanthodu Valley of Attapadi Block I. In the Silent Valley it is remarkable that its occurrence is strictly confined to the south of the Chembotti stream, and thence across the Kundipuzha along the Kummattanthodu and to the south of it. Practically no *Cullenia* occurs to the north of this line.

72. Throughout this sub-type *Cullenia* and *Palaquium* exhibit a distinct habit of gregariousness.

In moist shady ravines gregarious patches of the slender, graceful palm, *Pinanga dicksonii*, are prevalent, the habit being due to its reproduction from rhizomes.

73. (2) *The Palaquium-Mesua association.*—This occurs in the Silent Valley only, and is there confined to the area lying between that part of the valley occupied by the *Cullenia-Palaquium* association, and that to its north, where the *Pœciloneuron-Palaquium* association prevails. The Thondakolam plateau, the spurs radiating from the Poochipara hill and the adjoining area to the east of the Kundipuzha, are covered by this association.

74. The dominant species are those which give the name to the sub-type, the conspicuous feature being the almost entire absence of *Cullenia*, and *Pœciloneuron*, species which distinguish the associations to the south and north, respectively. The codominants are *Calophyllum elatum*, *Heritiera papilio*, and *Artocarpus integrifolia*. The sub-story is similar to that of the previous association, but *Elæocarpus munroii*, *Cinnamomum zeylanicum*, *Agrostistachys indica* and *A. longofolia*, and *Euonymus angulatus* are prominent.

75. The elevation varies from 3,000′ to 3,750′ ; as the latter height is approached, *Palaquium* falls off in quality, as indicated by a preponderence of smaller diameter-classes and a deficit in the higher classes, and the *Mesua-Calophyllum* association begins to assert itself.

76. The incidence of species is given below :—

Species.	Incidence per acre.	Species.	Incidence per acre.
1 *Palaquium ellipticum*	6·38	7 *Bischofia javanica*	0·21
2 *Mesua ferrea*	3·06	8 *Eugenia sp.*	0·15
3 *Calophyllum elatum*	1·37	9 *Dysoxylum malabaricum*	0·05
4 *Cullenia excelsa*	0·29	10 *Acrocarpus fraxinifolius*	0·01
5 *Artocarpus integrifolia*	0·29	11 *Cedrela toona*	0·01
6 *Hopea glabra*	0·25		

77. This association contains *Palaquium* of good quality and mature sizes, but *Mesua* of smaller diameter classes and the regeneration of this species occurs with striking infrequency.

Patches of *Pinanga dicksonii* occur in the ravines.

Open grassy blanks and the distinctly edaphic *Reed-Calophyllum* association, are included in this sub-type.

78. (3) *The Pœciloneuron-Palaquium association.*—This sub-type is confined to the northern half of the Silent Valley, on both sides of the Kundupuzha. The rainfall is higher in this locality than elsewhere in the Silent Valley, and the soil remains damp for most part of the year, if not actually marshy.

79. The minimum elevation at which it is found in the Silent Valley is limited by that of the locality, viz., 3,000′, and the maximum is fixed by the advent of sub-tropical dryness at about 4,000′.

80. The dominant species are *Pœciloneuron indicum* and *Palaquium ellipticum*, with an admixture of *Mesua* and *Calophyllum*, in varying proportions. The following statement shows the incidence of the important species in the association :—

Species.	Incidence per acre.	Species.	Incidence per acre.
1 *Pœciloneuron indicum*	18·69	5 *Artocarpus integrifolia*	0·36
2 *Palaquium ellipticum*	9·77	6 *Eugenia sp.*	0·21
3 *Mesua ferrea*	2·71	7 *Bischofia javanica*	0·01
4 *Calophyllum elatum*	0·80		

81. The codominant species characterized by their absence from this community are :—*Cullenia excelsa*, *Vateria macrocarpa* and *Heritiera papilio*. The sub-dominant species are those common to other associations.

82. Of all the species found in the rain-forest, *Pœciloneuron indicum* exhibits the most marked gregariousness, and ability to regenerate successfully. Young seedlings, advance-growth, poles, mature and overmature trees—all are found in large numbers.

The proportion of *Mesua* increases with elevation and that of *Palaquium* diminishes.

83. (4) *The Mesua-Calophyllum association.*—At elevations above 3,750′, the *Palaquium-Mesua* association gives place to this sub-type. The conditions for the growth of *Palaquium* are on the wane as this height is approached, as is evident from the falling off in the incidence of this species in the higher diamater classes, though a considerable number remain in the smaller sizes, in the moister localities.

There appears a corresponding increase in the incidence of *Mesua* and *Calophyllum* and a considerable increase in the younger diameter classes of the former, which are usually deficient in all other *Mesua*-bearing associations except the *Cullenia-Mesua* association. The quality of both *Mesua* and *Calophyllum* is, however, distinctly poorer.

The association thrives up to an elevation of about 4,500′, beyond which *Mesua* tends to disappear, though *Calophyllum* struggles on in a more stunted form up to 5,000′, where the tropical rain-forest merges into the sub-tropical evergreen.

84. There is a marked change in the associated species and the undergrowth. The associates are mainly :—*Litsea oleoides*, *L. stocksii*, *Gordonia obtusa*, *Elæocarpus munroii*, *Cinnamomum zeylanicum*, *Cinnamomum sulphuratum*, *Eugenia sp.*, *Symplocos spicata*, *Alseodaphne sp.*, and *Actinodaphne bourdilloni*. The understory is characterized by a heavy growth of *Strobilanthes*, of several species, up to twenty feet high, which retards regeneration considerably.

85. Two varieties of this association are met with, one in the moist areas of the Silent Valley where there is an admixture of *Palaquium* of the smaller diameter classes, chiefly in the transition zone, but practically none above 7′ in girth ; and the other on the eastern most slopes of Bolampatty Block II, where the rainfall is much lower and *Palaquium* is almost negligible, but *Vateria* prevails instead along perennial streams.

86. The incidence of species for these two varieties is as follows :—

Moist Variety.

Species.	Incidence per acre.	Species.	Incidence per acre.
1 *Mesua ferrea*	10·73	6 *Eugenia sp.*	0·34
2 *Palaquium ellipticum*	5·71	7 *Cullenia excelsa*	0·21
3 *Calophyllum elatum*	2·31	8 *Artocarpus integrifolia*	0·15
4 *Pœciloneuron indicum*	1·05	9 *Bischofia javanica*	0·10
5 *Hopea glabra*	0·64	10 *Dysoxylum malabaricum*	0·01

Dry Variety.

Species.	Incidence per acre.	Species.	Incidence per acre.
1 *Mesua ferrea*	9·16	6 *Palaquium ellipticum*	0·52
2 *Calophyllum elatum*	5·83	7 *Artocarpus integrifolia*	0·41
3 *Vateria macrocarpa*	4·40	8 *Bischofia javanica*	0·15
4 *Eugenia sp.*	1·35	9 *Acrocarpus fraxinifolius*	0·01
5 *Nephelium longana*	0·71		

87. The association prevails in the Silent Valley at elevations between 3,750′ and 4,500′ to the east of the Kundipuzha and to the north of Walakad. The bits of shola which have escaped the ravages of the kumri cultivator on the tops of the ridges in Attapadi Blocks I to V, belong to this type. Where these last bits of shola descend to slightly lower elevations or are situated on dry easterly slopes, an admixture of *Acrocarpus* and *Cedrela* indicates a descent into the semi-evergreens. The shola on the top of Bolampatty Block II also belongs to this type.

Typical localities are the area between Walakad and Sispara and that round the Poonamalai rest-house.

88. (5) *The Vateria-Cullenia association.*—It may be mentioned at the outset that not a single specimen of *Vateria macrocarpa* has been observed within the Attapadi Blocks I to V, the Silent Valley, and the major portion of the Chenat Nair sholas. A few trees may be seen in the Kalladikode valley of the Chenat Nair reserve, but the species occurs in profusion only in Attapadi Block VI and in the sholas of Bolampatti Block II, where it occurs in gregarious patches and grows to enormous dimensions. The species has been identified by the Forest Botanist, Dehra Dun, and is definitely stated to be different from *Vateria indica*.

89. Almost pure patches of *Vateria* may be found along streams throughout Attapadi Block VI and Bolampatty Block II, where trees of good quality may be found at elevations below 4,000′. Similarly, in wet localities above this elevation, the tree is again found almost pure, but stunted and of a distinctly poorer quality. At lower elevations the predominant mixture is that of *Cullenia*, and of *Palaquium* of smaller diameter classes, while at the higher, there is a comparatively larger percentage of *Mesua ferrea*.

90. The association occupies the whole of the north-east corner of Attapadi Block VI, which drains northwards through the Pothuparapallam and its tributaries. The catchment area of this stream is covered by a net work of streamlets which make the locality unusually wet and therefore eminently suited to this edaphic sub-type.

91. Its gregariousness is very prominent and its regeneration second to none, not even to *Pœciloneuron*. The codominants are *Cullenia excelsa*, *Palaquium ellipticum*, *Mesua ferrea*, *Polyalthea coffeoides*, *Calophyllum elatum* and an occasional *Pœciloneuron*.

92. The incidence of species is given below :—

Species.	Incidence per acre.	Species.	Incidence per acre.
1 *Vateria macrocarpa*	16·37	7 *Nephelium longana*	0·30
2 *Cullenia excelsa*	5·74	8 *Bischofia javanica*	0·26
3 *Palaquium ellipticum*	5·83	9 *Artocarpus integrifolia*	0·13
4 *Mesua ferrea*	4·55	10 *Aglaia sp.*	0·04
5 *Eugenia sp.*	0·69	11 *Cedrela toona*	0·02
6 *Calophyllum elatum*	0·64	12 *Dysoxylum malabaricum*	0·01

93. (6) *The Mesua-Cullenia association.*—In localities suitable for the *Cullenia-Palaquium* association, when elevation or aspect becomes unsuitable for large *Palaquium*, *Mesua* thrives to the detriment of the latter and the *Cullenia-Mesua* association takes the place of the *Cullenia-Palaquium* sub-type. There is usually an appreciable number of *Palaquium* of the lower diameter classes, but the incidence and quality of *Mesua*, in all girth classes, is comparable with those in the *Mesua-Calophyllum* association. The association takes its name from the preponderance of *Cullenia*, of large size, over *Palaquium*. The elevation varies from about 3,500′ to a little over 4,000′. There is usually a mixture of *Calophyllum elatum*, and sometimes of *Acrocarpus fraxinifolius* (Anangan-thodu valley of Attapadi Block I) of good quality.

94. This sub-type is found in Attapadi Block I (northern half of Panthanthodu valley, and the Anangan-thodu valley), Attapadi Block VI (near Velligiri peak and on either side of the Muthikulam waterfall) and in the 'Lost Valley' of the Chenat Nair Reserve.

95. The incidence of species is :—

Species.	Incidence per acre.	Species.	Incidence per acre.
1 *Mesua ferrea*	9·59	8 *Nephelium longana*	0·28
2 *Palaquium ellipticum* ..	4·77	9 *Hopea glabra*	0·12
3 *Cullenia excelsa*	3·65	10 *Acrocarpus fraxinifolius* ..	0·09
4 *Calophyllum elatum* ..	1·32	11 *Aglaia sp.*	0·09
5 *Eugenia sp.*	0·71	12 *Cedrela toona*	0·03
6 *Bischofia javanica* ..	0·49	13 *Vateria macrocarpa* ..	2·64
7 *Artocarpus integrifolia* ..	0·39	(found only in Attapadi Block VI.)	

96. (7) *The Reed-Calophyllum association.*—This community is a localized edaphic climax, situated within a wider association.

On the Thondakolam plateau of the Silent Valley, and on the western slopes to the south of Kathisundan, are considerable stretches of reeds (*Ochlandra*) inhabiting marshy tracts, where small streams stagnate for the greater part of the year. The ground is a series of pits and mounds when dry, caused by the impeded flow. Standing over the reeds, as standards over coppice, are trees chiefly belonging to the following species :—*Calophyllum elatum*, *Hopea glabra*, *Eugenia sp.* and *Bischofia javanica*. The pit-and-mound formation helps the regeneration of the trees as the mounds afford the necessary degree of drainage to prevent the rotting of seedlings.

97. The rainfall is not sufficient for the occurrence of *Pœciloneuron indicum*, which is absent. The undergrowth consists largely of *Agrostitachys longifolia* and *Agrostistachys indica*, among the reeds. And the *Calophyllum* shows the same tendency to stagheadedness that it exhibits at elevations above 4,000′, though its occurrence under such conditions is worthy of note.

98. (8) *The Reed-Pœciloneuron association.*—This is another edaphic climax prevailing under conditions of heavier rainfall, where the soil is inclined to be marshy.

This community is similar to the previous one, except that, in addition to the other dominant species common to both, there is a preponderating percentage of *Pœciloneuron indicum*. The latter forms the dominant crop as *Calophyllum* did in the last.

99. It is confined to the banks of the Kundipuzha in the Silent Valley, where it occurs adjacent to the *Pœciloneuron-Palaquium* association.

100. Of the shola forests described above, a large part of the area found in the Chenat Nair reserve was exploited under American logging methods between 1920 and 1929. The sholas in the Dhoni and Sappal valleys were heavily logged. In the Elival valley, the logging was less heavy and was combined with the extraction of railway sleepers of *Mesua ferrea* and * kolmarams and chattams of *Palaquium* and *Calophyllum*.

The Kalladikode valley has been under selection fellings from 1930. The "Lost Valley," to the north of Palamalai, has not been worked.

101. Light selection fellings were commenced in the southern extremity of the Silent Valley in 1928, and the available area to the west of the Kundipuzha has been completed by March 1932.

102. The Panthanthodu valley in Attapadi Block I is under selection fellings at the time of writing.

103. The rest of the shola is practically virgin forest, except for the extraction of a few trees of *Dysoxylum malabaricum*, over 30 years ago.

(c) *The Sub-Tropical Evergreens.*

104. This type is usually distinct above an elevation of 5,000′, and thrives best at higher levels, though a transition stage may be distinguished between 4,500′ and 5,000′ with characteristics intermediate between tropical rain-forests and sub-tropical evergreens.

The trees are much shorter than those in the rain-forests, though species like *Calophyllum elatum*, *Actinodaphne hookeri*, *Litsœa stocksii*, *Cinnamomum sulphuratum*, *Canthium didymum* and *Eugenia sp.* are common to both types. Lichen and moss infest the branches and trunks more freely. With increase in elevation, *Rhododendron arboreum*, *Gaultheria fragrantissima* and other species common in the Nilgiri sholas, make their appearance, as may be seen near Sispara.

105. This type occurs mostly in the Silent Valley, Attapadi Blocks I, V and VI and parts of Bolampatty Block II, where it covers an area of 43,000 acres under the "Protection Working Circle." In the Chenat Nair Reserve it is confined to a small area on the top of Palamalai.

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* Kolmarams are scantlings 15′ × 6″ × 4″ used for shafts of bullock carts. Chattams are scantlings 10′ × 6″ × 3″ used for their frames.

106. Several species of *Strobilanthes*, forming extensive thickets of undergrowth up to 25′ in height, are characteristic of this type.

SECTION 2.—SILVICULTURE AND UTILIZATION OF THE MAIN SHOLA SPECIES.

107. The season of heavy rainfall, from June to September, is a period during which shola trees exhibit comparatively little vegetative activity ; this is probably due to the screen of clouds letting through very little sunlight and to the reduced soil-aeration consequent on incessant downpours of rain. No young leaves are put forth in this season and few flowers bloom.

A great majority of the seeds which fall with the commencement of the monsoon do not germinate till September, as in the case of *Mesua ferrea, Heritiera papilio, Cinnamomum zeylanicum* and *Scolopia crenata* ; some like those of *Palaquium ellipticum* germinate directly the monsoon breaks, but the seedlings confine themselves to the development of the roots (a necessary anchorage against being washed away by the torrential rains) and the first pair of leaves, during the rainy season.

Vegetative activity commences in September with flushes of young leaves and flowers, and continues till the arrival of the monsoon—the process is continuous and prolonged on account of the equable climate and the multiplicity of species met with. There is little danger to young seedlings from drought, as the humidity remains high during this period, being periodically augmented by occasional showers.

108. The special silvicultural characters of a few of the most important timber trees of this formation are described in the following paragraphs :—

(*a*) *Mesua ferrea*.

109. This is the most economically important species occurring in the sholas as the railway companies pay well for sleepers made from this tree—in fact its demand is limited to sleepers at present.

110. Two varieties are met with, one with distinctly larger flowers and fruits than the other.

111. Within the division the species occurs between 2,500′ and 4,500′ above sea-level, but grows best between 2,500′ and 3,750′, under rain-forest conditions, on deep, fertile, well drained soil. (A specimen has been observed in Cochin, on the sands of the west coast.) It does not tolerate marshy conditions or stiff clay and is therefore rarely found in reed areas. Under the best conditions it occurs scattered or in more or less pure patches of small extent. The tendency to gregariousness is marked where the soil is rocky, on the margins of sholas adjoining grass land, and in the *Mesua-Cullenia* and the *Mesua-Calophyllum* associations which normally prevail above an elevation of 3,750′.

112. The incidence of this species for different diameter classes in the associations in which it occurs is given below :—

Associations.	Incidence per acre in diameter classes.								
	12″–16″.	16″–20″.	20″–24″.	24″–28″.	28″–32″.	32″–36″.	36″–40″.	Over 40″.	Total.
Cullenia-Palaquium—									
(*a*) *Vateria variety*	0·65	0·63	0·73	0·49	0·36	0·16	0·07	0·14	3·23
(*b*) *Non-Vateria variety* ..	0·80	0·72	0·63	0·60	0·45	0·26	0·17	0·25	3·88
2 *Palaquium-Mesua*	0·76	0·76	0·63	0·42	0·26	0·13	0·06	0·04	3·06
3 *Pœciloneuron-Palaquium* ..	0·57	0·55	0·63	0·43	0·26	0·12	0·07	0·08	2·71
4 *Mesua-Calophyllum*—									
(*a*) *Moist*	2·45	2·43	2·26	1·49	0·97	0·53	0·27	0·33	10·73
(*b*) Dry	3·24	2·45	1·78	0·93	0·40	0·19	0·08	0·09	9·16
5 *Mesua Cullenia*	2·44	2·18	2·16	1·31	0·76	0·33	0·16	0·25	9·59
6 *Vateria-Cullenia*	1·20	1·19	0·88	0·70	0·32	0·13	0·06	0·07	4·55

113. These figures show (*a*) a high incidence in all diameter-classes for the *Mesua-Calophyllum* and *Mesua Cullenia* associations and satisfactory regeneration, (*b*) a smaller incidence in other associations, disproportionately small in the lower diameter classes, indicating unsatisfactory conditions for regeneration ; the *Pœciloneuron-Palaquium* association is the worst in this respect, (*c*) the smallest incidence, in the highest diameter classes, compared with the total incidence in the association, for the *Mesua-Calophyllum* and *Mesua Cullenia* associations, indicating drop in quality and (*d*) the existence of overmature trees over 40″ in diamater in considerable numbers. A comparison with the incidence in the diameter-classes of other species occurring in the same associations, shows a general poverty in the incidence of *Mesua* of *all* diameter classes in the *Cullenia-Palaquium, Palaquium Mesua, Pœciloneuron-Palaquium,* and *Vateria-Cullenia* associations, when compared with *Cullenia excelsa, Pœciloneuron indicum* and *Vateria macrocarpa*. This uniform general poverty in all diameter classes, combined with the presence of overmature trees, is not only indicative of a set-back due to competition, but also leads one to infer that all the species

referred to invaded the locality almost simultaneously. The significance of a comparison with the incidence of *Palaquium ellipticum* will be discussed later under the silviculture of that species.

114. *Leaf-shedding, flowering, etc.*—Old leaves fall from October and the pink-and-white young leaves appear on young seedlings from the same month, though older trees come into flush only in January-February. The snow-white flowers appear from February to May but have been observed as late as August. During these months the floor is strewn with the white petals. The fruits ripen in these forests in April-May, so that they appear to take about 13 months to mature, but this required confirmation. Full grown, but unripe, fruits have been picked up in January. About 150 to 200 large seeds go to the pound, but seeds of the smaller variety weigh much less, about 500 to the pound.

115. *Silviculture.*—The species is a shade-bearer when young but less so than its associates, *Palaquium* or *Cullenia*.

116. The tree seeds almost every year but the seeds are eagerly sought after by rats, mouse-deer, squirrels, porcupine and other vermin, which also destroy a large number of seedlings for the sake of the cotyledons. Careful selection of seeds at the right time is essential for good results. Ripe fruits are usually available in April-May and may be identified by their deep-brown colour and signs of dehiscence. With sound seeds, over 50 per cent should germinate.

117. Seeds sown in June have germinated as late as September and it appears to be the rule for naturally fallen seeds to germinate similarly. Dibbling in September is likely to suffer less from vermin than when done in June.

118. Natural regeneration occurs under shade which is necessary as a protection from the sun. Dense undergrowth is detrimental to development but high shade appears to afford the best conditions for establishment.

119. In *Cullenia—Palaquium—Palaquium—Mesua* and *Pœciloneuron-Palaquium* associations, the natural regeneration of *Mesua* is under a heavy handicap. *Palaquium, Pœcilonueron* and *Cullenia* all seed profusely almost every year and their seeds are less liable to insect damage, so that these species are more gregarious. For these reasons natural regeneration of *Mesua* is unable to compete successfully with the other species.

This has resulted in the comparatively smaller incidence of *Mesua* in these associations, especially in the lower diameter classes, as shewn in the foregoing statement.

An enumeration in a hundred gaps of the natural seedlings in the *Cullenia—Palaquium* association of the Silent Valley, showed confirmatory results ; the number of gaps with no established *Mesua* seedling was 26, while those with no established seedling of *Palaquium* was only 13.

120. In the *Mesua-Calophyllum* and the *Mesua-Cullenia* associations, the competition from the more shade bearing and prolific species mentioned above is absent, and in consequence, the incidence of *Mesua ferrea* is considerably higher, in *all* diameter-classes, and regeneration and advance-growth are met with in satisfactory quantities. But the conditions of growth are less advantageous, so that the quality, as indicated by height and girth, is lower.

121. *Artificial regeneration.*—In Tinnevelly, dibbling and notching are reported to have succeeded if the patches are protected from rats and other vermin by a palisade of reeds or sticks about two feet high. The dibbling was carried out in May-June from seeds collected in April.

Seeds dibbled two inches deep so that the cotyledons remained inside the soil, invisible to vermin, are reported to have given successful results in the Wynaad.

One year old nursery transplants put out at the outbreak of the south-west monsoon, have given excellent results in the Chenat Nair Reserve, when planted under the high shade of an unbroken top canopy, with the undergrowth removed.

Nursery transplants, 1½ and 5 months old, put out in July and September-November, have given 78 and 50 per cent success, respectively, in Tinnevelly ; fencing the nursery is emphasised.

122. For the stocking of gaps created by selection fellings, dibbling in fenced patches, deep dibbling and the planting out of one year old nursery seedlings, are indicated. In large gaps, the edges, where high shade is available, should be selected ; in smaller gaps, where overhead light is not intense or where there is some middle storey left to afford the necessary shelter against the sun, any site should do.

The undergrowth should not be allowed to swamp the seedlings as this retards growth.

123. In gaps caused by the extraction of *Mesua*, it is a good plan to plant or dibble in amongst the branches of the fallen crown. The crown persists in the case of this species for many years, gives modified shade to the seedlings, and affords a natural protection from browsing or other mechanical damage.

124. The incidence of hollow trees at different diameters, as judged during enumerations, is given below, for all associations in which *Mesua* occurs :—

Diameter class.	12″–16″.	16″–20″.	20″–24″.	24″–28″.	28″–32″.	32″–36″.	36″–40″.	Over 40″.	Total.
Percentage of hollow trees ..	6·5	9·4	13·0	16·4	19·9	25·6	27·5	34·6	13·3

Hollowness increases gradually until it is over one-third of trees above 40″ in diameter. Constant suppression might be a contributory cause.

125. *Rate of growth.*—Troup gives the following figures for the Nambor forests, Sibsagar (Assam) :—

	YRS.
One foot 6 inches G.B.H.	20
Three feet G.B.H.	40
Four feet 6 inches G.B.H.	50
Six feet G.B.H.	90

The gross and net outturn for different girth classes will be found in the statement given under paragraph 395.

(*b*) *Palaquium ellipticum*.

126. This tree is a strong shade bearer. It occurs in more or less pure patches, between 2,500′ and 3,500′ elevation, where the soil is deep, moist and well drained. It does not tolerate ill-drained soil or stiff clay and is therefore rarely found in reed associations. It is more exacting than *Mesua* or *Calophyllum* in its demand on soil, rainfall and elevation, and is seldom found in the comparatively dry sholas of the *Mesua-Calophyllum* association on easterly slopes.

127. The incidence of this species, in the associations which it affects, is given below :—

Associations.	Incidence per acre in diameter classes.								
	12″–16″.	16″–20″.	20″–24″.	24″–28″.	28″–32″.	32″–36″.	36″–40″.	Over 40″.	Total.
1 *Cullenia-Palaquium*—									
(*a*) *Vateria variety*	4·27	2·86	1·96	0·73	0·33	0·11	0·04	0·05	10·35
(*b*) *Non-Vateria variety* ..	1·61	1·23	0·92	0·53	0·30	0·11	0·05	0·08	4·83
2 *Palaquium-Mesua*	2·50	1·93	1·19	0·47	0·19	0·07	0·02	0·01	6·38
3 *Poeciloneuron-Palaquium* ..	3·97	2·95	1·82	0·68	0·25	0·07	0·02	0·01	9·77
4 *Mesua-Calophyllum*—									
(*a*) *Moist*	3·04	1·68	0·71	0·19	0·07	0·02	..	..	5·71
(*b*) *Dry*	0·17	0·19	0·12	0·03	0·01	..	..	..	0·52
5 *Vateria Cullenia*	3·28	1·66	0·61	0·22	0·05	0·01	..	..	5·83
6 *Mesua-Cullenia*	1·46	1·32	1·07	0·52	0·25	0·08	0·04	0·03	4·77

128. These figures show that (*a*) the incidence of this species is highest in the *Cullenia-Palaquium* (*Vateria* variety) *Pœciloneuron-Palaquium*, and *Palaquium-Mesua* associations, in *all* diameter classes, (*b*) it is lowest in the *Mesua-Cullenia* association, (*c*) the higher diameter-classes are of poor incidence in all associations, (*d*) it is insignificant in the *Mesua-Calophyllum* (dry) association and (*e*) younger diameter-classes are well represented in almost all associations.

129. These observations lead to the inference that *Palaquium* does not *thrive* at elevations above 3,750′ affected by *Mesua-Calophyllum* and *Mesua-Cullenia* associations. Also it is apparent that either the species is a comparatively new invader of these localities or that the conditions are not suitable for its attaining large dimensions. Since large trees are by no means uncommon, but only their incidence is lower than that of *Mesua* of similar dimensions occurring in the same association, and since the incidence of *Palaquium* in the lower diameter classes is high but that of *Mesua* of similar dimensions disproportionately low, it seems to be a reasonable conclusion that *Palaquium*, a later invader, is displacing the old occupant, *Mesua*, from associations below 3,750.′

130. *Leaf-shedding, flowering, etc.*—Old leaves fall in October-November and are replaced by young ones almost simultaneously.

The tree flowers in January-March and the fruit is stated by Mr. E. V. Padmanabha Pillai to ripen about 15 months later with the onset of the second monsoon, in June. This point requires confirmation. The seed germinates immediately after reaching the ground, but sometimes does so when still on the tree. It contains a large percentage of oil very similar in constitution to *mohwa* oil (*Bassia latifolia*) and is reported to be suitable for soap-making.

131. *Silviculture.*—The species is one of the strongest shade bearers in these sholas. In the associations it dominates it shows a strong tendency to oust weaker shade bearers like *Mesua* or *Calophyllum*.

It seeds almost every year and good seed years are frequent. The seeds in these forests are not sought after by vermin so eagerly as in Tinnevelly, so that natural regeneration under suitable conditions is prolific. Under the heavy shade of mother trees, where light conditions are unfavourable for heavy undergrowth, the floor is usually carpeted with seedlings one to two feet high. Established seedlings and advance growth are rarely met with under such conditions, however, but a break in the middle canopy, such as obtains on the edges of elephant paths, or one in the top canopy, natural or artificial, lets in sufficient light for the stimulation of growth ; poles and advance growth are then abundant. Enumeration of seedlings over a hundred gaps in the Silent Valley revealed no more than five gaps without any *Palaquium* seedling.

132. On coupe lines demarcated by the removal of the undergrowth and most of the middle storey, two years' observation of natural seedlings did not reveal any adverse effects due to the opening. Further observations and experiments are, however, necessary for the determination of the right degree of light to be admitted in order to stimulate the natural regeneration that often exists profusely on the ground and to enable it to develop. Experiments with this object will be undertaken by the Provincial Silviculturist, as prescribed in paragraph 710.

133. *Artificial regeneration.*—The fact that this tree does not yield one of our most valuable timbers and the prolific natural regeneration that usually attends this species preclude the necessity for raising it artificially. In Tinnevelly, dibbling in patches protected by fences, has yielded satisfactory results. Transplanting nursery seedlings two weeks old with their cotyledons clipped off, to reduce the attention of vermin, has also given encouraging results.

134. The incidence of hollowness at different diameters is given below ; the gross and net outturn figures will be found in the statement given under paragraph 395.

Diameter class.	12″–16″.	16″–20″.	20″–24″.	24″–28″.	28″–32″.	32″–36″.	36″40″.	Over 40″.	Total.
Percentage of hollow trees . .	2·3	3·0	4·0	5·7	6·1	7·7	11·2	14·1	3·4

135. *Utilization.*—The demand for this species is at present mainly in the dry districts of the Madras and Bombay Presidencies, in the shape of kolmarams and chattams. The kolmaram measures 15′ × 6″ × 4″ and the chattam, 10′ × 6″ × 3″; they are primarily intended for shafts and frames of bullock carts. But the sizes are suitable for their subsequent conversion into rafters and in this form they are also largely used.

The timber is of medium weight, straightgrained and reasonably resistant to the attack of white ants. Properly seasoned, its splitting propensities are no worse than those of other well-known timbers, especially when used in localities where humidity does not vary much. That it is not in greater demand in Malabar is due to the fact that better known timbers from the more accessible deciduous forests are available at competitive prices.

136. The species is capable of producing a heavy crop per acre under proper silvicultural treatment, it has a marked tendency to gregariousness and it appears to be comparatively easy to regenerate it naturally. It grows to large dimensions—trees 150 feet in height with 80 to 100 feet of clean cylindrical bole and a girth of 10 feet at breast height are not uncommon. With a heavy more or less pure crop on the ground, mechanical extraction methods might be justified, especially if a more general use of the wood develops, as may well happen. The species appears to have considerable future possibilities.

(c) *Calophyllum elatum.*

137. Two different varieties appear to prevail, one with obovate, coriaceous leaves, with dark, deeply furrowed bark, and the other with larger, elliptic, membranous leaves with a yellowish but smoother bark ; no differences are recognized in the following notes.

138. *Calophyllum elatum* is one of the most widely spread species in tropical evergreens and appears to be very accommodating in its requirements. It is found at as low an elevation as 1,500 feet, but near perennial water courses, and it rises up to 5,000 feet or more into the temperate evergreens, where it is stunted. It grows best on deep well drained soil at elevations between 2,000 feet and 4,000 feet, but is sometimes the only important species that prevails in marshy reed-associations. It is one of the pioneers to succeed *Symplocos*, *Gordonia* or *Elæocarpus* in the natural extension of a shola into neighbouring grassland. On rocks or in swamps it thrives, but it exhibits marked gregariousness only when free from the competitien of heavy shade-bearers like *Palaquium*, as in reed-associations, or at elevations above 4,000 feet, as round Poonmalai-bungalow, in the Silent Valley ; it is not at

its best, however, under these conditions. It is one of the most important associates in our easternmost sholas, as in Bolampatty Block II, where its quality is poorest, however, on account of reduced rainfall and high elevation.

139. *Flowering, fruiting, etc.*—Flowers appear from February onwards : the fruit ripens in May. Seed years are not frequent.

140. *Silviculture.*—The species is a shade bearer of about the same degree as *Mesua.* Young seedlings, advance growth and poles are found scattered about, but gregariousness is exhibited only under somewhat adverse conditions. Seedlings want shade when young and persist for a long time under a mass of *Strobilanthes,* a common understorey in the *Mesua-Calophyllum* association.

141. *Artificial regeneration.*—One year old nursery transplants put out under heavy shade, after the removal of the undergrowth, have shown marked success in the Chenat Nair Reserve. Dibbling was not successful.

142. *Utilization.*—The timber is crossgrained though handsome in appearance. It is liable to warping when used on the West Coast but kilnseasoned wood has been used in the drier districts for motor bus bodies, with satisfactory results. There is a limited demand for kolmarams and chattams though *Palaquium* is preferred.

(*d*) *Acrocarpus fraxinifolius.*

143. A deciduous species inhabiting semi-evergreens, it is sometimes met with in the true sholas. It is conspicuous by its large dimensions, clean straight bole with large plank-buttresses and by its bark which peels off from below in long curved flakes.

It is found in the semi-evergreens of Chenat Nair Reserve, in the transition stage between monsoon forest and rain forest (1,500 feet to 2,500 feet) and in the somewhat drier sholas of Attapadi Blocks I to V and Bolampatti Block II, in the *Mesua-Calophyllum* association, at an elevation of about 4,000 feet. The quality falls off at these elevations and hollowness is more pronounced.

144. *Leaf shedding, flowering, etc.*—The tree is leafless early in November and fresh leaves and flowers appear in November-December. The flowers are sought after by birds, probably for nectar, which destroy some of the inflorescence. The pods, which are light and easily broken off, are blown long distances by the wind. They ripen from March to May.

145. *Silviculture.*—The species is a strong light demander and often appears in small groups. Young seedlings require complete overhead light from the start, but soil dessication round the roots should be guarded against in the early stages, especially under semi-evergreen conditions, as the species is not deep-rooted.

Early growth is good, one year old seedlings four feet high not being uncommon.

Natural regeneration in gaps in semi-evergreen forests is prolific in the year after the creation of the gaps and when the ground is reasonably clear of weeds. Seedlings grow in crowds, and grow fast, but are eventually overtopped by faster growing weeds like *Trema orientalis, Leea sambucina,* and *Macaranga roxburghii,* and overtopped seedlings mostly perish by the end of the second season. This has been clearly observed in the rigs (cleared strips along which the sky-line for high-skidding was run, when the forests were logged under American methods) of Chenat Nair Reserve. Once ahead of weeds, for two or three successive years, the tree grows so fast that very few weeds can catch it up.

In the Chenat Nair Reserve, an area of logged evergreen forest was clearfelled and burnt and attempts were made to stock it with species like *Palaquium ellipticum, Vateria indica* and *Cullenia excelsa,* without success. A later attempt to plant *Hopea parviflora,* and *Artocarpus hirsuta* met with partial success, but the most prominent crop on the area now is *Acrocarpus,* the result of natural regeneration from mother trees in the adjoining forest. The attention bestowed on *Hopea* seedlings kept the weeds out of the area, with great advantage to the naturally sown *Acrocarpus.* This area is now known as "Fischer's burn."

146. *Artificial regeneration.*—The germination per cent of untreated seeds seldom exceeds 20, but those treated with strong sulphuric acid for twenty minutes have given as high as 48 per cent in Tinnevelly. The cotyledons and first pair of leaves of seedlings raised from acid-treated seeds are often bleached white but this passes off. The germination period is 2–4 weeks but seeds often lie dormant for a whole year, under rainforest conditions, and germinate at the end of it. Treated seeds germinate quickly.

Dibbling in May, in gaps made by selection fellings in the Silent Valley, gave very promising results during the first year, but it was found that seedlings receiving direct overhead light in the middle of the larger gaps showed much faster growth than those at the edges. Seedlings in small gaps, where overhead light was feeble, showed poor growth. At the end of the second year the results were discouraging.

A lepidopterous caterpillar, *Terias sylhetana*, completely defoliated almost every plant in November, but this was probably not very serious, as the ravages were on the old leaves which would be shed in that month, normally. A second generation has been observed in June-July, and this must have had more serious consequences. And another attack, probably by a grub that bores into the leading shoot, has latterly increased the death roll. At the end of the second year the results have not been as encouraging as in the beginning. But there appears to be a good chance of sufficient number surviving and thriving in the centre of the larger gaps in the sholas.

It is not suited for growing in pure plantations as it has a host of enemies, including game. Game destroyed a whole plantation of this species, some 20 acres in extent, at Mount Stuart, when it was about 3 years old, by completely stripping the young trees of their bark.

147. The timber is valued mainly for cart-shafts for which very good prices are obtained —up to Rs. 3 per cubic foot for a kolmaram.

148. Annual rings may be counted with some difficulty. A tree 6′ 6″ in girth at breast height, showed 65 rings. (Silent Valley, 3,200 feet.)

(e) *Dysoxylum malabaricum.*

149. A tall graceful tree, with a clean straight, cylindrical bole, growing scattered in the rain forest, between 2,500′ and 3,500′. It is found on deep well drained soil, especially in the neighbourhood of perennial streams. The bark has characteristic vertical and horizontal raised lenticels of a light corky colour.

150. The timber used to be in considerable demand on the West Coast of Madras for the manufacture of oil-casks used in exporting cocoanut oil to European markets but, with the export of copra instead of oil, the demand for this timber has fallen considerably. The wood is pale yellow, has a fine scent and is very durable.

151. The tree flowers in February-March and young fruits are in evidence in June but do not ripen till August. Red squirrels and monkeys eat a large quantity of the fruits and *Trypetid* larvae account for a good number of what is left. It was only by isolating a seed tree and protecting its trunk by thorns so that monkeys and squirrels could neither jump into its branches nor climb up it that some seeds could be collected.

152. The seeds germinate by the middle of September but the cotyledons and young shoots are eaten by monkeys and squirrels, so that it is difficult to raise them in the open without protection. Seedlings grown under wire-netting were exposed on losing their cotyledons and were found free from danger.

153. The percentage of germination is high, over 75 per cent of sound seeds germinate. A fungus attacks the seeds if kept without sowing for any length of time.

The multitude of its enemies apparently accounts for the small number of natural seedlings found in the forests.

Deep dibbling, or fencing dibbled patches, or using nursery transplants that have lost their cotyledons, indicate possible solutions.

154. The species is suitable for introduction into small gaps or at the edges of larger gaps where some shade is available.

SECTION 3.—SUCCESSION IN RAIN—FORESTS.

155. The successional series that invade the ground wherever there has been a setback from the climax conditions, natural or artificial, often afford valuable clues to the proper silvicultural treatment of these forests, the silviculture of important species and the lines on which the future regeneration of the sholas and of the enclosed grass lands may be successfully undertaken.

156. Examples of succession may be found in: (*a*) The tea-estate at Walakad, abandoned some 50 years ago, and in grass-land formations adjoining sholas, (*b*) the sholas of the Chenat Nair Reserve, heavily damaged by the American Logging methods, (*c*) heavily worked private forests in the vicinity, and (*d*) the old unregulated fellings in the unlogged areas of Chenat Nair and the gaps created by light selection fellings in the Silent Valley.

157 (*a*) In the sea of grass which has resulted from the abandoned tea-estate and also on open grassland formations common in sholas, the first invaders appear to be a species of bracken and a kind of ground-orchid with pink-and-yellow flowers. These are followed by *Wendlandia notoniana*, *Mœsa perrottetiana*, and *Glochidion malabaricum*, and sometimes by *Hypericum mysorense*. (Palamalai.) *Gordonia obtusa* and *Symplocos spicata* get in at the edges and form an almost complete canopy of middle-sized trees up to 30 feet high. The

succession developes further with the appearance of *Acronychia laurifolia, Elæocarpus munroii, Meliosma arnottiana, Litsea stocksii, Olea dioica, Allophyllus cobbe,* and *Linocera malabarica* and finally passes into one of the climax communities described as associations. *Calophyllum elatum* and *Mesua ferrea* are among the first entrants into the climax, yielding place later to *Cullenia* and *Palaquium,* if conditions are suitable.

On the edges of grassland adjoining a shola, *Wendlandia* and *Glochidion* are not always a necessary preliminary phase. *Symplocos spicata, Gordonia obtusa, Linocera malabarica, Croton scabiosus, Mæsa perrottetiana* and *Sarcococca brevifolia* appear on elephant paths on the edges of grassland and help to keep down the grass ; these are followed by *Macaranga roxburghii* and *Clerodendron infortunatum,* and succeeded later by *Elæocarpus munroii, Elæocarpus serratus, Canarium strictum, Canthium didymum* and *Vernonia arborea.* The climax follows with the final invasion by *Calophyllum* and *Mesua.*

The importance of preserving a few *Calophyllum* and *Mesua* on the margins of grassland will be evident from the nature of the succession revealed above. Where the locality is comparatively dry (south of the Muthikulam bungalow, near the waterfall) an almost pure crop of *Acronychia laurifolia* has invaded the grass next to the shola. A few *Mesua, Glochidion, Macaranga, Croton* and *Kydia calycina* are mixed with the *Acronychia.*

On grassland with shallow rocky soil, *Phyllanthus emblica, Sterculea guttata, Erythrina indica* and shrubby *Dalbergia latifolia* are followed by *Lagerstrœmia lanceolata* and *Sapium insigne.*

Almost the first shola tree to enter is *Heritiera papilio,* a species that affects rocky outcrops in sholas. *Calophyllum* and *Mesua* follow, if the locality be not too dry, but the conditions are likely to continue unsuitable for *Cullenia* or *Palaquium,* as neither thrives on shallow, rocky soil.

158. (*b*) In the heavily 'logged' sholas of the Chenat Nair Reserve, all timber down to a breast height diameter of one foot was removed, leaving behind the advance growth of useful species and unsound trees. The sudden exposure and the strong monsoon winds destroyed most of these. A mass of weeds immediately took possession of the ground, out of which emerged, in the course of two or three years, soft wooded, fast growing species such as, *Leea sambucina, Trema orientalis* and *Macaranga roxburghii,* which are now 25–30 feet high. Under the shade of these softwoods, regeneration of the evergreen species of the locality has either managed to survive or has come into being, in some quantity. The species chiefly represented are *Calophyllum elatum, Artocarpus integrifolia, Heynea trijuga, Lansium anamalayanum, Mesua ferrea* and *Palaquium ellipticum.* Where the conditions have been thrown back to a still further stage, species typical of semi-evergreen forests, like *Acrocarpus fraxinifolius,* have spread naturally, as in 'Fischer's burn.' In what manner natural succession may be helped forward in these areas is a subject for future experiment.

The logged semi-sholas of the same reserve, which border on the true sholas, contain a few *Calophyllum* and *Mesua,* among species like *Artocarpus hirsuta, Acrocarpus fraxinifolius, Lagerstrœmia lanceolata, Bischofia javanica, Chukrassia tabularis, Cedrela toona, Hopea parviflora* and *Hopea wightiana.* Soon after the 'logging' the gaps were alive with numerous seedlings of *Acrocarpus, Chukrassia, Cedrela, Lagerstrœmia* and *Bischofia,* the fruits or seeds of which are light. There were weeds—*Trema orientalis, Macaranga roxburghii,* and *Cæsalpinia mimosoides*—but these did not then look menacing.

At the end of the first year, the weeds began to get the upper hand, and many of the seedlings of the valuable species mentioned above were supressed, while by the end of the second year, only a few were able to overtop the weeds and survive.

It will therefore be seen that the same weeds which help to preserve the regeneration of the evergreen species are destructive to that of the semi-evergreens such as *Acrocarpus* and *Chukrassia.*

159. (*c*) *Heavily worked private forests.*—Unlike the simultaneous logging of all timber, saleable or unsaleable, that was practised in the Chenat Nair forests, private owners deplete a shola gradually over a series of years, removing the most valuable and largest-sized timber first, then the less valuable species and smaller sizes, and so on, until nothing economically exploitable is left behind . The process is thus selective and gradual. *Dysoxylum malabaricum, Palaquium ellipticum, Calophyllum elatum* and *Mesua ferrea* has been the order of demand and therefore of the supply.

The original crop is now in a deplorable state, no doubt, but is far from having been wiped out as is the case in certain parts of the Chenat Nair Reserve. A selection felling of about thirty of the most valuable trees per acre would describe the condition fairly well.

The result has been the growth of a mass of *Macaranga, Leea,* cardamoms and various other soft wooded and herbaceous species, but in amongst growth of this type, and elsewhere, the natural regeneration of species like *Palaquium* has had suitable conditions for development, owing to the admission of light. The result is apparent in the appreciable amount of the advance growth of *Palaquium* that may be found here.

160. (*d*) *Gaps caused by old unregulated fellings in the Chenat Nair Reserve and by recent light selection fellings in the Silent Valley*—In the gaps created some thirty years ago or more in the Chenat Nair Reserve, by unregulated fellings, natural regeneration of *Palaquium* is prolific and has developed into all stages including poles. But very little advance growth of *Mesua ferrea* is in evidence—the sub-type belongs to the *Cullenia--Palaquium* association.

In the Silent Valley, selection fellings limited to a maximum of three trees per acre were started in 1928. The species felled were *Mesua ferrea, Palaquium ellipticum* and *Calophyllum elatum,* chiefly.

The size of the gaps so created varied from 50′ × 30′ to anything up to 100′ × 66′. The nature of the invading vegetation that follows the fellings depends to a marked degree on the size of the gaps and the type of association surrounding them. The understorey usually disappears as a result of the extraction.

In the lightest gaps, almost the only invader is the cardamom plant—*Elettaria cardamomum,* a species of considerable economic value. Young regeneration of *Palaquium,* of which there is usually a large amount, and of *Mesua,* receive very satisfactory conditions for establishment and growth, and the cardamom, where it is interfering, can be cut away at a small cost. The regression from the climax is made good in a short time and, with judicious cultural operations, the incidence of useful species may be improved considerably in the succeeding climax--community. A substantial revenue from the cardamoms may also be expected every year, after the fifth year from felling.

Somewhat larger gaps, where *Heckeria subpeltata* and the dreaded "devil's nettle," *Laportea crenulata,* appear along with the cardamom, are more prevalent, however. The nettle is easily managed if one realizes its presence and takes elementary precautions against being stung.

The largest gaps are invaded by a short, light grass, *Laportia, Macaranga roxburghii, Leea sambucina,* the wild plantain, a species of *Scitaminae* and by *Toddalia asiatica,* in the first year, under the shade of which cardamoms appear later. More tending is necessary to prevent the stagnation of natural regeneration where it exists and young *Palaquium* is not likely to stand the large opening created. But the conditions permit the introduction of new species suited to the locality, like *Gluta travancorica* from Tinnevelly. They also enable the introduction, in the centre of the largest gaps, of valuable species like *Acrocarpus fraxinifolius* and *Artocarpus hirsuta,* which are occasionally met with in these forests, and which will decidedly increase their future economic value.

SECTION 4.—INJURIES TO WHICH THE CROP IS LIABLE.

161. *Climatic.*—Unusual delay in the outbreak of the south-west monsoon prolongs the fire season and increases the danger from fire.

Long breaks in the monsoon result in damage to regeneration, natural and artificial. Torrential rains cause landslips, especially in heavily logged sholas, as in the Chenat Nair Reserve.

The strong westerly winds which precede the south-west monsoon and the equally strong winds from the east in November to March, have caused considerable damage to young teak plantations in Sappal (Chenat Nair Reserved Forest) by bending over young saplings, which have had to be cut back, in many cases, in consequence.

The westerly winds, in particular, help to disperse the seeds of several species of weeds belonging to the *Compositæ* chiefly (such as *Cosmos sp*) with the result that heavy weed growth spreads westwards into new plantations.

The easterly winds help to fan sparks into spreading forest fires.

162. *Fire.*—The danger from fire is greatest in the deciduous forests of the Chenat Nair Reserve. In this reserve, regeneration in the deciduous and the semi-deciduous areas is

severely damaged almost every year, in some part or other. A severe fire in 1929 did considerable damage to young *Hopea* advance growth and regeneration in the Elival Natural *Hopea* area.

In the Shola forests, grass land is often burned by collectors of minor forest produce, resulting in severe damage to the margin of the shola. Such fires, if repeated, will assuredly result in the gradual destruction of the sholas.

Fires sometimes cross over from the adjoining private deciduous forests into the shola, as was the case in 1929 round Nilikal in the Silent Valley, when there was a strong wind blowing. The damage in such cases is more severe than in the deciduous forests, as shola trees are very susceptible to fire. Advance growth and poles succumb easily and even large trees are often killed.

The result of repeated fires in a shola may be seen in the north-east corner of Attapadi Block VI, where fires from the adjoining estates have ruined a part of the reserve. The area is a sea of grass and weeds, with a few trees dotted over them, and presents the appearance of a savannah.

A distinct danger from an intense ground-fire consists in the complete sterilization of the soil in parts of coupes intended for teak planting, where too fierce a burn has resulted in a thorough baking of the soil. In such places (as in Sappal Coupe III and Elival Coupe III) teak stumps have failed to thrive. Such intensive burning of slash as will result in the total sterilization of the soil, resulting in the death of all useful soil-bacteria, is not therefore to be recommended.

Statistics of fires will be found under Chapter V.

163. *Injurious plants.—Trema orientalis, Leea sambucina, Acacia pennata* and *Caesalpinia mimosoides* are very injurious to the natural regeneration of *Acrocarpus fraxinifolius, Chukrassia tabularis, Cedrela toona* and *Lagerstroemia lanceolata* in the semi-deciduous 'logged' areas and 'rigs' of the Chenat Nair Reserved Forest. They suppress and almost wipe out the natural regeneration of these species.

Generally speaking, climbers are a menace to natural regeneration in the forests, as also to plantations of *Hopea parviflora* and *Artocarpus hirsuta*.

Lantana is spreading in Thampurattipottai Reserved Forest, Dhoni Reserved Forest, parts of Chenat Nair Reserve and in Panakadan Reserve. It hinders regeneration and makes inspection difficult but provides soil-cover.

Grassland in the shola is very susceptible to fire.

Toddalia aculeata and *Paramignya armata* infest the gaps in the sholas and compete with the artificial regeneration. *Strobilanthes*, of various species, hinders shola regeneration to some extent

Weeds belonging to the *Compositae*, such as *Cosmos sp.* and *Ageratum conyzoides*, spread rapidly into young teak plantations and are a menace to be constantly kept in check. Their westward spread is more prominent as westerly winds precede the rainy season.

The weed *Blainvillea rhomboidea* has been rapidly spreading into teak plantations for the last three years and is a more serious menace on account of its spiny fruits.

Loranthus, *Epiphytic fici* and *Fagrea obovata* are often met with in the sholas. Over-mature trees of *Mesua ferrea* are often infested with a bracket fungus, probably a *Polyporus*.

164. *Insects.*—In teak areas, the usual defoliators and skeletonisers (*Hybloea puera* and *Hapalia machaeralis*) are present but the damage is not serious. The larvae of a species of *Phassus* are more destructive, as they bore down into the pith of young plants, which causes them to snap off in a strong wind. These larvae feed also on other trees such as *Gmelina arborea, Mallottus philippinensis* and *Trema orientalis*, so that it appears to be difficult to get rid of them.

A pest on *Acrocarpus fraxinifolius* has sprung into prominence in the larvae of *Terias sylhetana*, a *Pierid* butterfly, with the artificial regeneration of this species in the Silent Valley. The larvae are known to feed on other leguminous plants as well. They feed on the leaves, strip the plants bare and pupate in rows on the remnants of the petiolule. There appears to be two generations of this pest in one year, the first in June and the other in November. The damage due to the November generation is comparatively negligible, as the plants shed their leaves normally by November or December.

The fruits and seeds of *Dysoxylum malabaricum* are riddled by swarms of *Trypetid* grubs.

The mahogany shoot-borer attacks and kills the leading shoots of *Swietenia macrophylla* at Dhoni when the overhead cover over saplings is removed too early or too drastically. This results in the putting forth of duplicate and triplicate leaders. Young plants under shade are practically immune.

165. *Animals.*—Damage from wild elephants is at present slight since there are no plantations so far in localities frequented by them. It is, however, likely to become considerable when plantations are started in Chindaki, Thadikundu and Kalladikode blocks, under the Teak Conversion Working Circle.

Damage by deer is negligible.

Black monkeys and Malabar squirrels destroy large quantities of various kinds of seeds in the sholas. The fruits of *Dysoxylum malabaricum* and *Elæocarpus munroii* require special mention as they are very much sought after. Not a single fruit of *Dysoxylum* could be saved from these robbers until a tree had been isolated and its trunk protected by thorns. Monkeys are also suspected of destroying seedlings of this species for the sake of the cotyledons.

Suspicion has fallen on rats, squirrels and porcupines as being responsible for the disappearance of the seeds of *Mesua ferrea* dibbled in patches. These vermin have also been suspected in Tinnevelly of the same offence.

166. *Unknown cause.*—Twisted fibre in *Mesua ferrea* timber has been noticed occasionally.

167. *Man.*—In the deciduous areas of the Chenat Nair reserve, in the Dhoni and Puliampalli beats, illicit removal of dead fuel and fodder grass is fairly common, owing to the proximity of the boundary to cultivation and villages. Illicit preparation and removal of charcoal also prevails in these beats to an appreciable extent.

In the Panakadan and Kottanikunnu reserves, which are surrounded by wet lands and a large Mappilla population, there is some illicit removal of dead fuel and small timber but what is more pernicious is the extensive removal, illicitly, of green-leaf manure.

Except in Bolampatty Block II, the sholas are practically free from illicit fellings. Fellings of *Mesua ferrea* are, however, common in Bolampatti Block II, where plough shafts are made of this species. No other shola timber appears to be in demand from these slopes.

An analysis of the property seized in connexion with offences detected in Bolampatti Block II, during the last three years, does not reveal any *Mesua* timber. That the protection of this shola has been seriously neglected is a justifiable inference.

The offences detected in the various reserves for the past 12 years are exhibited in the following statements :—

(a) *Statement of offences in Chenat Nair, Dhoni, Puliampalli Tope and Thampurattipottai reserves of the Palghat Range from* 1920–21 *to* 1931–32.

Year.	Timber and fuel.	Minor forest produce.	Grazing.	Fire.	Hunting and fishing.	Timber transit rules.	Miscellaneous.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1920–21	7	9	6	..	..	4	..	26
1921–22	3	1	4	1	1	6	..	16
1922–23	5	11	4	1	..	13	..	34
1923–24	10	8	4	..	1	16	..	39
1924–25	10	9	5	..	1	11	..	36
1925–26	3	18	1	..	..	5	..	27
1926–27	12	3	2	..	1	4	..	22
1927–28	8	8	..	..	..	1	..	17
1928–29	7	8	2	..	..	1	..	18
1929–30	1	4	..	..	..	..	..	5
930–31	10	7	1	..	1	..	..	19
931–32	9	6	7	..	..	7	..	29
Total ..	**85**	**92**	**36**	**2**	**5**	**68**	..	**288** for 12 years.

Remarks.—Offences appear to be few, considering the proximity of the reserves to Palghat. Offences under timber Transit Rules are unusually prominent.

(*b*) *Statement of offences in the Mannarghat Range from* 1921–22 *to* 1931–32.

Year.	Timber and fuel.	Minor forest produce.	Grazing.	Fire.	Hunting and fishing.	Timber transit rules.	Miscellaneous.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			(1) *Panakadan and Kottanikunnu Reserves and Timber Transit Rules.*					
1921–22	..	..	..	..	..	3	..	3
1922–23	7	2	..	..	..	18	..	27
1923–24	2	..	..	..	..	1	..	3
1924–25	2	3	2	..	..	5	..	12
1925–26	1	..	..	..	..	10	..	11
1926–27	1	1	..	1	1	..	..	4
1927–28	2	1	..	..	..	..	..	3
1928–29	..	2	..	..	..	2	..	4
1929–30	2	..	..	..	..	1	..	3
1930–31	3	2	1	..	..	1	..	7
1931–32	2	2	1	..	..	1	..	6
Total ..	**22**	**13**	**4**	**1**	**1**	**42**	..	**83**

Remarks.—No offences were reported in 1920–21.

Offences under timber transit rules are unusually prominent. Offences appear to be few considering the fact that this small block is surrounded by wet cultivation and a large Mappilla population.

			(2) *Silent Valley.*					
1927–28	1	..	..	..	..	..	..	1
			(3) *Attapadi Blocks I to V.*					
1921–22	..	..	..	1	..	..	..	1
1922–23	1	..	..	..	..	..	* 6	7
1923–24	1	..	..	..	..	..	..	1
1924–25	..	..	..	..	..	..	* 1	1
1925–26	1	..	..	..	..	..	..	1
1926–27	1	..	..	..	..	..	..	1
1927–28	..	..	..	..	..	..	..	..
1928–29	..	..	..	..	..	..	..	..
1929–30	1	..	..	..	..	..	..	1
1930–31	..	..	..	..	..	..	..	..
1931–32	..	..	..	..	..	..	..	..
Grand total ..	**28**	**13**	**4**	**2**	**1**	**42**	**7**	**97** for 12 years.

Remarks—No offences were reported in 1920–21.

* Unauthorized cultivation.

(*c*) *Balampatti Range.*

(1) *Attapadi Block VI.*

1921–22 .. .. One case of illicit shooting. No other offences reported from 1920 to 1931.

(2) *Bolampatti Block II* (*Shola only*).

1931–32 .. .. One case of illicit felling of *Acrocarpus fraxinifolius*. No other offences reported from 1920 to 1931.

SECTION 5.—THE FAUNA.

168. It may at first be noted that sholas are, on the whole, less frequented by wild animals than is usually surmised. The enormous number of leeches that infest the forest floor during the greater part of the year, in the writer's opinion, probably accounts for this comparative absence of wild life. Animals that inhabit trees, and birds, occur in large numbers, however.

169. Black monkeys (of which there are two species, one long-tailed, the Black Lungur, and the other with a shorter but tasselled tail, the Lion-tailed monkey) the red Malabar squirrel, and bears, are fairly common : Aruvampara is a favourite resort of bears.

170. Panthers, spotted and black, have both been encountered.

171. Sambhur frequent the edges of sholas and the grassland enclosures.

172. Mouse-deer are a favourite food of the red dogs.

173. Ibex have been noticed on Vannampara and the Nilikal rock in the Silent Valley ; on Periakottamalai, near Havelock's, in Attapadi Block I ; on the cliffs to the South-east of Muthikulam in Attapadi Block VI ; and on Palamalai in Chenat Nair. They appear to be subject to much poaching. That this is so is borne out by the fact that the herds of does and small bucks are small and are more timid than is usually the case with these animals, which live in such inaccessible and unfrequented localities.

174. Elephants pass through the sholas into the enclosed grasslands, or into the bamboo of the adjoining deciduous forests, camping in reed areas for short periods. They do not make long halts in the heart of the sholas for want of good grazing since reeds are not as much a favourite food of theirs as are bamboos. The Panthothode Valley of Attapadi Block I, the grass round Muthikulam, the northern half of Attapadi Block VI, and the Kalladikode Valley, are favourite retreats, since deciduous forests and hill cultivation adjoin these localities.

175. There is a large variety of winged population, ranging from the 'great horn-bill' to tiny little 'nut-hatches,' and many are adorned with variegated colours. The blue-black 'whistling school boy' is the common singer of the sholas.

176. The whole area is infested with snakes, vipers being specially numerous. There were several cases of snake bite among the coolies during enumeration work but, though all showed symptoms of poisoning and suffered considerably, no one succumbed. A snake-bite lancet was found to be a valuable companion and was probably responsible for the saving of several lives; it is recommended that every subordinate working in these forests be supplied one of these lancets, with the advice to carry it with him always.

177. The insect-fauna have been dealt with under the previous section.

CHAPTER III.—UTILIZATION OF THE PRODUCE.

SECTION 1.—AGRICULTURAL CUSTOMS AND WANTS OF THE POPULATION.

178. With the exception of the inhabitants of Palghat and Coimbatore towns, the surrounding population is mainly agricultural.

179. The demand for agricultural implements in the Malabar district is confined to those made from deciduous species like teak, rosewood (*Dalbergia latifolia*), *Xylia xylocarpa* and *Pterocarpus marsupium.* The major part of this demand is met from the extensive private forests in the district as also is the demand for small timber and bamboos required by the poorer classes.

180. Timber of better quality required for superior houses and bungalows, comes from the private forests of the west coast through Calicut or Kallai, and from the neighbouring Cochin State. The species most in demand for this purpose are: *Teak, Pterocarpus marsupium, Xylia xylocarpa, Terminalia tomentosa* and *Terminalia paniculata, Lagerstrœmia lanceolata, Grewia tiliæfolia, Artocarpus integrifolia* and *Artocarpus hirsuta, Dalbergia latifolia* and *Borassus flabelliformis* (Palmyra). Some Burma teak is also imported.

181. The agricultural population find their fuel in the surrounding private forests on laterite caps, on which *Xylia xylocarpa* and *Terminalia paniculata* thrive more or less gregariously, or from their own gardens, for, in the Malabar district, the house is usually situated in the midst of a garden of coconut, palmyra, areca, mango, jack and a few teak poles.

182. Palghat finds most of its fuel from private forests to the north and south, which export fuel even to Coimbatore, after meeting the demands of three tile factories.

183. Coimbatore obtains its timber mostly from the private forests of Malabar, the Government depot at Pollachi and the Cochin forests; some timber and fuel are supplied by the Walayar Government forests and Palghat.

184. A match factory at Palghat is fed by private timber—*Bombax malabaricum*, mango, *Tetrameles nudiflora* and such soft woods. Another at Kalladikode uses *Polyalthia sp.* and *Elæocarpus tuberculatus*, in addition to the usual species.

185. The agriculturists in the Bolampatti Valley of the Coimbatore district get their implements from the surrounding deciduous forests. Some demand for plough-shafts and plough-shares of *Mesua ferrea*, from the neighbouring sholas of Bolampatti Block II and Attapadi Block VI, is anticipated.

186. The deciduous forests proposed for exploitation under this plan have either been kumried, too heavily logged in the past (Chenat Nair) or are of too small extent (Panakadan) to affect the local demand for timber. The fuel that is likely to be put on the market will be so small a part of the normal demand that it will be absorbed with ease.

187. The local demand for timber from the shola (or rain) forests is very small. With the exception of a small demand for * kolmarams and † chattams of *Palaquium ellipticum* and *Acrocarpus fraxinifolius*, for bullock carts, shola timber is used hardly at all for constructional or other purposes.

188. Illicit removal of charcoal for domestic purposes and for use by the local blacksmiths is not uncommon in the Chenat Nair Reserve.

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* Kolmarams are scantlings 15′ × 6″ × 4″ used for shafts of bullock carts.
† Chattams are 10′ × 6″ × 3″ used for their frames.

189. There is also, at Palghat, a keen demand for fodder-grass, which is being removed illicitly from the Chenat Nair Reserve.

190. Chenat Nair Reserve is the only area covered by the plan which contains exploitable bamboo. All that this reserve can supply can be sold easily at Palghat.

191. There is a small demand for reeds (*Ochlandra sp.*) for baskets and mats. The villages find their supply in private forests which are more easily accessible than reserves. Palghat meets some of its demand from the Chenat Nair Reserve, under the permit system. Reeds (Vernacular 'Odai') to the value of Rs. 283 were sold in 1928–29.

192. *Minor Forest Produce.*—The leaves of the wild plantain are collected from the Chenat Nair Reserve and sold at Palghat.

There is the usual local demand for cardamoms, soap-nuts (*Acacia concinna*) honey, wax, wild pepper, cane, and *Vateria* and *Canarium* dammars.

193. *Manure leaves.*—There is some demand for manure leaves for wet cultivation. This is usually met from growth on private lands or from private forests. The reserves are not usually robbed of this material except in the case of the Panakadan and Kottanikunnu reserves, which form a small isolated block surrounded by wet cultivation.

Heavy rains and a humid climate induce a very rapid growth of vegetation on land not suited for wet cultivation and this meets the demand for green leaf manure, usually.

SECTION 2.—MARKETS AND MARKETABLE PRODUCE.

194. The principal markets for timber are Olavakkot and Palghat. The former is on the main South Indian Railway line, connecting the west coast with the eastern and southern districts of the Presidency, and is an important timber market, receiving its supplies from private and Government forests in British Malabar and from Cochin State, and distributing it eastwards. The Palghat market supplies local demands, mainly.

195. Local demand is chiefly for deciduous species like teak, rosewood, *Dalbergia latifolia, Pterocarpus marsupium, Lagerstrœmia lanceolata, Xylia xylocarpa, Terminalia paniculata* and a few kolmarams and chattams of *Palaquium ellipticum* and *Acrocarpus fraxinifolius*. There is no demand for *Mesua* timber.

196. At Olavakkot there is usually a keen demand from Coimbatore and of the eastern districts for all deciduous species and for kolmarams and chattams of Pal*aquium ellipticum, Acrocarpus fraxinifolius, Calophyllum sp.* and *Hopea glabra*. In common with the general trade depression, the demand for timber from these districts has however now fallen, so that Olavakkot is at present unable to absorb the whole of our possible annual output of kolmarams and chattams of shola species. Our full output is likely to be completely absorbed when trade improves.

197. The South Indian Railway Company, who monopolize our *Mesua* sleepers, take delivery of broad and metre gauge sleepers at Olavakkot, and at Melatur on their Shoranur-Nilambur branch.

198. The tile works at Olavakkot and the domestic needs of Palghat account for most of the consumption of fuel. From areas close to the Olavakkot station (Chenat Nair and Thampurattipottai Reserves) fuel can profitably be exported to Coimbatore by rail.

199. Bamboos, fodder-grass, plantain leaves and other minor produce find ready sale at Olavakkot and Palghat. Some reeds are removed from the Chenat Nair Reserve by local basket weavers.

SECTION 3.—LINES OF EXPORT.

200. The forests are well served by export routes from the plains to the markets.

But, with the exception of the Chenat Nair Reserve, there are no extraction routes within the forests, or from the forests to the road-heads in the plains.

201. The main export road is the trunk road from Calicut to Madras, passing through Mannarghat, Kalladikode, Mundur, Olavakkot, Palghat and Coimbatore. Several metalled roads branch off from this trunk into the district.

202. The South Indian Railway, broad gauge, connecting Mangalore and Madras, passes through Olavakkot, and Melatur is on its Shoranur-Nilambur branch. Most of the export is by rail, from Olavakkot towards the eastern districts.

203. The Palghat-Pollachi metre gauge section, newly opened this year, will afford through transport from Palghat to the Southern districts served by metre gauge lines Transhipment from broad to metre gauge will now be unnecessary, and this is likely to stimulate the demand from these districts.

204. Towards the eastern slopes, the main export roads are (1) the Muthikulam-Coimbatore road and (2) the Attapadi Estate-Thadagam ghaut road, continued from Thadagam to Coimbatore by the District Board. Part of Attapadi Block VI will have to be tapped through (2) and through cart-tracks leading into (1).

205. The manner of approach from the various reserves to main export routes, is as follows.

206. (1) *The Silent Valley Reserved Forest.*—The material is manhandled down to the foot of the hills, to the south or the west. Rough cart-tracks lead therefrom to Mannarghat, Alanallur, Kumaramputtur or Karuvarakundu. Thence along the main road to Olavakkot or along metalled roads to Melatur railway station.

The transport along cart-track varies from 5 miles to 25 miles ; along metalled roads to Melatur from 8 miles to 15 miles. Mannarghat to Olavakkot is 20 miles.

The railway sleepers from the private forests on the slopes to the west of the Silent Valley are often floated down the Olipuzha to Melatur, and kolmarams and chattams down to Beypore or Kallai. The material from the Silent Valley that finds its way westwards into the Olipuzha Valley, can be dealt with in the same manner.

207. (2) *Panakadan and Kottanikunnu Reserved Forests.*—A gravelled road three miles long leads from the vicinity of these reserves to the Mannarghat-Melatur road. Mannarghat is 10 miles away along these roads.

208. (3) *Attapadi Blocks I, II, III, IV and V.*—The material has to be manhandled down to the foot of the hills and thence carted to Mannarghat, along rough tracks, over some six miles.

209. (4) *Attapadi Block VI.*—There are four possible routes :—

(*a*) From the north-east corner, material will be manhandled to the head of the Attapadi Estate-road leading to Thadagam and thence to Coimbatore.

Attapadi Estate to Thadagam is 25 miles.
Thadagam to Coimbatore is 10 miles.

(*b*) From the eastern portion, manhandling down to the head of the Muthikulam-Coimbatore road (at Anayarkhandi) and thence to Alandurai and Coimbatore.

(*c*) From the western portion, manhandling down to the foot of the hills, thence along a rough-cart-track to the launching place on the Kanhirapuzha, down which the material can be floated to the Mannarghat-Olavakkot road, about 4 miles from Mannarghat. Thence to Olavakkot along the trunk road.

(*d*) As in (*c*), but down the Kanhirapuzha to Cherukara railway station on the Shoranur-Nilambur Railway, or further down to Pallipuram (on the Shoranur-Calicut line) or still further down along the Ponnani river, to Ponnani on the sea-coast.

210. (5) *Chenat Nair, Thampurattipottai, Dhoni and Puliampalli tope Reserves.*—A net-work of roads was constructed by the Logging Engineering Division all over the Chenat Nair Reserve, with the exception of the Kalladikode and the Karimpuzha valleys. These roads were used for carting timber in the log to the Olavakkot Saw Mills. A list of these will be found under "Special Works of Improvement undertaken."

These roads inside the reserve lead outwards to either (1) the Dhoni-Olavakkot road, 5 miles long or (2) the Elival-Olavakkot road, 10 miles long.

There are no roads inside the reserves in the Kalladikode and Karimpuzha valleys. The material has to be manhandled to the head of the Elival-Olavakkot road, from the Karimpuzha Valley (the "Lost Valley") and thence carted along the said road to Olavakkot. An alternative route is by the Karimpuzha river which is floatable during the monsoon, as far down as Vachapuram. A cart-track from the reserve boundary at the foot of the Kalladikode hills to the Mannarghat-Olavakkot road, 5 miles long, meets the latter about 11 miles from Olavakkot. Kolmarams and chattams may also be floated down from the foot of the hills along the Thuppanad river to the bridge on the main trunk road ; this is somewhat cheaper. Cart-tracks lead from the Thampurattipottai Reserve to the Elival-Olavakkot road and from the Puliampalli Tope to Kalladikode and Mundur, on the main trunk road.

A mile of unmetalled road connects the Dhoni Reserve with the Dhoni-Olavakkot road.

SECTION 4.—METHODS OF EXPLOITATION AND THEIR COSTS.

211. Up to about 1908 timber and fuel were worked both departmentally and through contractors. In that year, however, regular fuel coupes were organized and subsequently these have been leased out to contractors. Bamboos were worked both departmentally and through contractors until 1904; since then they have been leased to contractors. The right to collect minor forest produce has been leased out from the earliest times of which there is any record. In future there should be no difficulty in selling in auction the annual coupes for clear-felling and planting in the Chenat Nair reserve, the fuel coupes of Thampurattipottai reserve and the bamboo coupes prescribed for cutting on a three-year rotation. Timber from the Chindaki and Panakadan areas proposed for clear-felling and planting may have to be exploited departmentally.

212. The contractor's exploitation costs and the prices he realizes for his produce are as shown in the following statement. The figures are an average of the past three years :—

Kind of produce.	Cost of exploitation.		Sale price.	Remarks.
1 Fuel	Felling and stacking.	8 annas to Re. 1–4–0 per 50 c.ft.	Rs. 2–8–0 to Rs. 3 ..	At the coupe.
2 Bamboo (large).	Cutting and delivery at Olavakkot depot.	Rs. 18 to Rs. 30 per hundred.	Rs. 26 to Rs. 50 per hundred.	
Bamboo (small).	Do.	Rs. 8 to Rs. 12 per hundred.	Rs. 13 to Rs. 18 per hundred.	
Splits	Do.	5 annas per bundle.	6 annas to As. 6–6 per bundle.	
3 Sheekai *Acacia concinna.*	Collection and delivery at Mannarghat or Palghat.	Re. 1 per maund of 25 lb.	Rs. 1–8–0 to Rs. 2–4–0 per 1,500 tolas.	
4 Honey	Do.	Rs. 6 to Rs. 7 per tin of 4 gallons.	Rs. 8 to Rs. 11 per tin.	
5 Wax	Do.	Rs. 6–4–0 to Rs. 10 per maund of 25 lb.	Rs. 15 to Rs. 20 per 1,500 tolas.	
6 Cardamoms ..	Do.	Rs. 2 to Rs. 4 per maund.	Rs. 50 per 1,500 tolas.	
7 Vateria dammar.	Do.	Rs. 2–8–0 for 1,500 tolas.	Rs. 3 to Rs. 4 per 1,500 tolas.	
8 Plantain leaves.	....	....	2 annas per head-load.	Permits issued for collection.

213. *Methods of Chenat Nair Exploitation Division.*—During the period 1920–29, intensive exploitation of timber from the Chenat Nair reserve was attempted on a large scale under the control of American Engineers. Various methods were employed, largely mechanical, and they included coolie and buffalo 'yarding' to heads of pole roads or slides, sliding, tractor yarding, skidder yarding, elephant yarding, ground yarding, high-lead yarding, overhead yarding, floating and carting. By 'yarding' is meant hauling logs from stump-site to road head. It is neither possible nor necessary to deal individually with these multifarious methods, but the average cost of some of these operations is given in the statement below. It was observed by the Forest Engineer that from the lower areas hauling by elephants was the most economical method and one which was the only possible thing to do during the monsoon. The methods are discussed in more detail in Chapter V.

Statement of production costs per cubic foot in Chenat Nair Exploitation Division.

Particulars.	Up to end of 31st March 1922.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30 up to 31st October 1929.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	
1 Felling and logging ..	..	..	0 0 6·4	0 0 5·64	0 0 4·45	0 0 4·48	0 0 5·25	0 0 5·71	0 0 5·9	
2 Dragging by coolies from stump-site to road.	..	..	0 3 6·5	0 2 11·57	..	0 2 5	*0 1 11·55	*0 3 5·72	0 2 1·3	* Includes elephant dragging.
Dragging by elephants ..	..	..	..	..	..	..	..	..	0 3 9·7	
Dragging by coolies to slide head and sliding.	..	..	0 3 6·3	0 1 2·37	..	..	..	..	..	
Repairs to paths and slides.	..	..	0 1 4·4	0 0 6·09	..	..	..	..	..	
Tractor yarding	..	..	0 2 9·9	0 5 0·03	..	0 2 8·31	0 2 8·62	0 2 6·44	0 4 10·6	
Total ..	..	..	**0 11 3·1**	**0 9 8·06**	**0 5 8·10**	**0 5 1·31**	**0 4 8·17**	**0 5 11·56**	**†0 4 9·0**	† Weighted average.
3 Carting to depot ..	..	..	0 2 2	0 2 8·02	..	..	0 3 2·66	0 3 2·89	0 3 7·9	
Feed and keep of buffaloes.	..	..	0 2 8·5	0 1 0·12	..	..	..	..	..	
Repairs to roads ..	..	..	0 0 9·5	0 1 10·26	..	..	0 0 4·46	0 0 9·75	0 2 2·1	
Depreciation on roads ..	..	..	0 1 7·2	0 2 1·43	..	..	0 2 0	0 2 0	0 1 10·2	
Total, Carting ..	..	..	**0 7 3·2**	**0 7 7·83**	**0 6 0·01**	**0 6 1·83**	**0 5 7·12**	**0 6 0·64**	**0 7 8·2**	
4 Loading and depot work.	..	..	0 0 5·9	0 0 4·94	..	..	..	..	..	This item is since shown in Profit and Loss Account.
5 Overheads	..	..	1 5 0·5	0 8 11·32	0 3 6·23	0 3 9·27	0 5 6·62	0 2 11·86	0 5 7·7	
Total cost of production of logs at mill depot (items 1 to 5) . .	**‡ 2 14 0**	**‡ 0 11 6·5**	**2 8 7·1**	**1 11 2·29**	**0 15 6·79**	**0 15 5·21**	**1 0 3·16**	**0 15 5·79**	**1 2 6·8**	Excluding overheads.
6 Working expenses of saw mill.	..	..	..	..	§1 15 1·1	§1 4 3·98	1 1 0	0 11 7·34	2 1 1·87	§ Includes kiln seasoning.
7 Total cost of production of sawn scantlings allowing for wastage in sawing.	..	..	..	..	3 11 1·1	3 8 0·49	2 12 9·7	2 6 4·51	4 1 6·67	
8 Dry kiln running expenses.	..	..	..	..	..	‖0 0 6·48	0 9 7·85	0 7 6·02	0 11 2·3	‖ Only direct coolie charges.
9 Total cost of production per cubic foot of kiln seasoned scantlings.	..	..	..	..	..	3 8 6·97	3 6 5·55	2 13 10·53	4 12 8·97	
10 Felling, sawing and carting to depot of kolmarams, chattams and vittams. (Total production cost.)	..	..	..	..	..	1 8 9	1 2 5·10	1 0 1·55	1 2 6·1	
11 Sleeper conversion, dragging and carting to depot. (Total production cost.)	..	..	..	..	..	..	1 13 0·7	1 9 4·78	1 6 7·6	Per cubic foot.

214. *Selection fellings.*—The extraction of *Mesua* sleepers and of kolmarams and chattams of *Palaquium* and other species commenced departmentally in the Silent Valley in 1928 and is still in progress. The trees to be felled are marked by a forester trained for the purpose, who measures and notes the girth at breast height and estimates the length of workable bole of the marked tree. The tree is then ringed with tar at breast height, blazed near the ground and numbered serially; separate serial numbers are used for each species. The marking is completed before the close of the financial year, usually by the end of February.

Felling and conversion commences in April. Felling is done with the axe, and the logs are sawn at stump-site on saw platforms made of poles. The production of broad gauge sleepers is aimed at, metre gauge sleepers being sawn only when the dimensions of the available timber make it unavoidable, or from broad gauge sleepers which have been rejected at stumpsite. The forester in charge of felling supervises the logging and conversion and passes at stump-site such of the sleepers, kolmarams, and chattams as come up to specification. On passing, a serial number (separate for each class of material) and letters indicative of the species, are chiselled on the timber. The sawyers are paid for felling and conversion, on the number passed at stump-site, at the following rates :—

	RS. A. P.	Dimensions.
1 *Mesua* or *Xylia* broad gauge sleeper	1 8 0	9′ × 10″ × 5″
2 *Mesua* or *Xylia* metre gauge sleeper	0 12 0	6′ × 8″ × 4½″
3 Metre gauge sleeper from rejected road gauge sleeper.	0 8 0	
4 Kolmarams—		
Palaquium	0 11 0	15′ × 6″ × 4″.
Calophyllum	0 11 0	
Hopea glabra	1 0 0	
Acrocarpus	1 0 0	
5 Chattams—All four species ..	Half of items in (4).	10′ × 6″ × 3″

The passed material is thereupon handed over to the dragging coolies, who prepare drag-holes, affix ropes or forest fibre or lengths of rattan, and drag it down to suitable depots at the head of cart-tracks at the foot of the hills. On delivery at such depots, if the material is sound and of the required sizes, the coolies are paid at rates depending on lead and difficulty. The rates have varied as follows :—

	Silent Valley.	Chenat Nair. RS. A. P.
1 *Mesua* broad gauge sleeper	Rs. 1 8 0 to Rs. 2	1 0 0
2 *Mesua* metre gauge sleeper	Half of a broad gauge.	Half of a broad gauge.
3 Kolmarams	As. 12 to As. 15	0 10 0
4 Chattams	Half of kolmarams.	Half of kolmarams.

215. Departmental elephants and buffaloes were employed in coupes II and III for dragging broad gauge sleepers from remote stump-sites to depots from which coolies could drag them down to the cart-tracks; coolies were also employed to free sleepers obstructed by trees along the drag-paths when elephants or buffaloes were dragging them. These methods were given up because the elephants lost condition on account of which two of them succumbed, fodder for the buffaloes had to be taken up from the plains, so that the operation was more costly than coolie dragging.

216. The material is then carted to the sale depots at Melatur (sleepers only) or Olavakkot (sleepers, kolmarams and chattams). The carting charges depend on the lead, but have varied as follows during the past four years :—

	RS. A. P.
1 Carting one broad gauge sleeper from foot of hill (Silent Valley) to Melattur	0 9 6 to 0 11 0
2 Carting one broad gauge sleeper from foot of hill (Chenat Nair) to Olavakkot	0 11 0 to 0 12 0
3 Carting one kolmaram from foot of hill (Silent Valley) to Olavakkot	0 7 0 to 0 8 0
4 Carting one kolmaram from foot of hill (Chenat Nair) to Olavakkot	0 5 0

The sleepers are then trimmed, clamped, spread out for passing and subsequently loaded in waggons.

217. Sleepers are sometimes floated down the Olipuzha in Mannarghat range and down the Tuppanad river in Palghat Range, during the rains, with the help of bamboos, but the transfer from cart to stream and stream to cart does not make this method of transport

appreciably cheaper than direct carting. From the Kalladikode valley to the main road floating is the only possible mode in the monsoons ; this is done on contract at the same rate as carting at other seasons.

218. Bad debts resulting from advances to sawyers and other coolies induced the department to look out for contractors and it has been possible to give the extraction work in the Silent Valley Coupes IV and V on contract, during 1931–32 and 1932–33. Under the conditions of the contract,

(1) trees in the coupe marked by the department as suitable for felling, to be felled, converted into sleepers, dragged down and transported to the sale depot. The sleepers also to be presented for passing and loaded into waggons.
(2) the contractor to construct drag-paths, cart-tracks, and coolie sheds at his own cost, the materials for shed construction being supplied free from the reserve,
(3) the contractor to trim and clamp the ends of sleepers and spread them for passing,
(4) the clamps to be supplied by the department, but chalk and white lead to be found by him,
(5) the sale-proceeds of rejected sleepers to be divided equally between the department and the contractor and
(6) the contractor to be entitled to the trimmed ends of the sleepers.

The department agreed to pay the contractor at the rate of Rs. 5–9–0 for every passed broad gauge sleeper and Rs. 2–6–0 for every passed metre gauge sleeper, from Coupe IV in 1931–32. The rates agreed upon for Coupe V in 1932–33 are Rs. 5–4–0 for a broad gauge sleeper and Rs. 2–7–0 for a metre gauge sleeper.

219. The costs of production of broad gauge and metre gauge sleepers passed by the Forest Utilization Officer for 1929–30 to 1931–32 are worked out in the following table :—

Cost of production of a broad gauge sleeper passed by the Forest Utilization Officer.

Operations.	Cost.				
	Silent Valley.			Chenat Nair.	
	1929–30.	1930–31.	1931–32. (contract.)	1930–31.	1931–32.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1 Marking	0 0 1	0 0 2·50	0 0 5·75	0 0 0·75	0 0 1·00
2 Felling and conversion	1 7 9	1 7 9·00	..	1 9 11·00	1 9 3·00
3 Coolie dragging	1 12 2	1 15 6·00	..	1 0 2·50	1 0 8·50
4 (*a*) Elephant dragging	0 2 11	0 7 5·00	5 9 0·00 (contract.)		
(*b*) Coolies to assist (*a*)	0 0 4	..			
5 Buffalo dragging	0 0 1	..			
6 Elephant harness and repairs ..	0 0 3	0 0 8·50			
7 Inspection of live-stock	0 0 3	0 0 4·25		..	..
8 Transport to sale depot	0 9 9	0 10 0·75		0 12 10·00	0 12 6·00
9 Trimming, clamping and numbering	0 2 9	0 2 11·00	..	0 2 5·75	0 2 1·00
10 Direct establishment on work ..	0 0 3	0 1 2·00	0 1 7·25	0 0 5·50	0 1 3·25
11 Miscellaneous (paths, sheds, etc.).	0 4 2	0 2 4·50	0 0 6·00	0 1 1·50	0 1 6·00
Total ..	**4 8 9**	**5 0 5·50**	**5 11 7·00**	**3 11 1·00**	**3 11 4·75**
12 Overheads including District Forest Officer	*0 12 6	1 5 6·00	*1 7 0·00	0 6 9·00	*0 12 6·00
Total cost of production ..	**5 5 3**	**6 5 11·50**	**7 2 7·00**	**4 1 10·00**	**4 7 10·75**

* *N.B.*—Overheads distributed also over extraction of kolmarams and chattams in these cases.

Cost of production of a metre gauge sleeper passed by the Forest Utilization Officer.

Operations.	Cost.				
	Silent Valley.			Chenat Nair.	
	1929–30.	1930–31.	1931–32. (contract.)	1930–31.	1931–32.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A P.
1 Marking	0 0 0·4	0 0 1	0 0 0·8	0 0 0·5	0 0 0·5
2 Felling and conversion ..	0 8 7	0 13 6	..	0 13 1	0 12 6·3
3 Coolie dragging	0 15 0	1 1 11	..	0 7 11	0 8 1·5
4 Carting	0 5 8	0 5 6	2 6 0 (Contract.)	0 6 5	0 6 1·5
5 Trimming, numbering, etc. ..	0 2 5·4	0 1 8·75	..	0 1 4·5	0 1 3
6 Direct establishment on work.	0 0 2	0 0 7·75	0 1 0	0 0 2·75	0 0 7
7 Miscellaneous (path, sheds, etc.).	0 1 8	0 1 5	0 0 8·0	0 0 6·5	0 0 8·3
Total ..	**2 1 6·8**	**2 8 9·5**	**2 7 8·8**	**1 13 7·25**	**1 13 4·1**
8 Overheads including District Forest Officer	*0 6 0	0 10 0	0 11 0	*0 3 4	*0 6 0
Total cost of production ..	**2 7 6·8** or **2 7 7**	**3 2 9·5** or **3 2 10**	**3 2 8·8** or **3 2 9**	**2 0 11·75** or **2 1 0**	**2 3 4·1** or **2 3 4**

* *N.B.*—Overheads distributed also over extraction of kolmarams and chattams in these cases.

SECTION 5.—PAST AND CURRENT PRICES.

220. Billet fuel was supplied to the Madras Railway Company from the Thampurattipottai reserve in 1895–96 at Rs. 2–9–8 per ton. The rates at which such fuel was supplied prior to this date are not available. Fuel supplied from Chenat Nair reserve in 1902–04 fetched Rs. 4 a ton, F.O.R. Podanur.

221. In 1896, the following sale rates are recorded for logs felled in the Chenat Nair reserve :—

	RS. A. P.	
Lagerstrœmia lanceolata	6 1 6	Per candy of 12·5 cubic feet.
Xylia xylocarpa	4 2 0	
Albizzia sp.	4 2 0	
Pterocarpus marsupium	8 0 6	
Stereosperum xylocarpum	6 0 0	
Dysoxylum malabaricum	6 12 0	
Hopea parviflora	7 9 6	

Hopea kolmarams were sold in the forest at Rs. 1–12–0 each.

222. In 1900–01 broad gauge railway sleepers of the undermentioned species were sold to the Madras Railway Company at the rates shown :—

	RS. A. P.	
Xylia xylocarpa	3 12 0	each.
Hopea parviflora	4 14 0	,,
Terminalia tomentosa	3 8 0	,,

223. In 1909, timber from selection fellings, in Chenat Nair, was auctioned, and fetched As. 13–6 per cubic foot for all species.

224. The prices fetched for fuel coupes worked under the coppice with standards system from 1906–07 to 1919–20, and for the areas clear-felled for planting teak, from 1928 to 1932, are given below (all in Chenat Nair and neighbouring reserves).

Year.	Name and number of coupe.	Area in acres.	Number of standards reserved per acre.	Price realized per acre in rupees.	Remarks.
1907–08	Dhoni III	34	31	80	
1908–09	Dhoni V	52	30	55	
1909–10	Dhoni VI	32	24	60	
1910–11	Dhoni VII	63	18	100	
1911–12	Dhoni VIII	50	24	120	
1912–13	Dhoni IX	45	22	40	
1913–14	Thampurattipottai X	51	22	70	
1914–15	Thampurattipottai XI	44	Not known.	65	
1915–16	Puliampalli XII	74	15	68	
1916–17	Dhoni Reserve XIII	45	20	19	
1917–18	Puliampalli XIV	45	28	150	
1918–19	Dhoni XI	36	25	63	
1918–19	Elival III-1	54	15	46	
1918–19	Elival II-1	38	24	115	
1918–19	Puliampalli III	65	17	100	
1918–19	Thampurattipottai Reserve (part).	50	Not known.	27	
1919–20	Dhoni XII	44	17	89	
1919–20	Elival IV-1	49	20	125	
1919–20	Puliampalli IV	76	15	100	
1919–20	Puliampalli tope	20	1	* 22	* The contractor agreed to plant up the whole area with teak, free of cost.
1919–20	Thampurattipottai Reserve (part).	50	Not known.	27	
1928	Dhoni series	26	Clear felling.	55	
1929	Do.	27·4	Do.	90	
1930	Do.	15·5	Do.	120	
1931	Do.	23	Do.	106	
1931	Elival series	55	Do.	6–12–0	Previously heavily logged by the Exploitation Division.
1931	Do.	13·5	Do.	18	
1931	Do.	10	Do.	31	
1932	Dhoni series	32	Do.	80	

225. The average prices realized for the various more important sorts of timber in the Palghat Range between 1921 and 1932 are tabulated below :—

Statement of prices obtained for timber and kolmarams at Olavakkot, 1921–32.

Produce.	1921.	1922.	1923.	1924.	1926.	1928.	1929.	1930.	1931.	1932.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P
Miscellaneous kolmarams, each ..	3 4 0	3 2 0	..	..	..	..	..	..	..	..
Teak logs, per c.ft.	2 2 0	2 0 0	..	..	..	..	..	..	..	..
Miscellaneous timber per c. ft. ..	..	0 12 0	0 4 2	0 4 2	0 3 0	0 6 0		0 13 2	..	..
Cullenia excelsa, per c.ft. ..	..	1 4 0	..	..	..	..	..	..	..	..
Machilus macrantha, per c.ft. ..	..	1 4 0	..	..	..	..	..	..	..	..
Rosewood planks, per c.ft. ..	..	2 8 0		..	..	..	..	..	..	..
Artocarpus hirsuta, per c.ft. ..	..	..	0 6 0	..	..	..	..	..	..	..
Bombax malabar icum per c.ft. ..	..	..	..	..	0 1 6	..	..	..	..	..
Palaquium kolmarams, each ..	..	..	..	..	..	3 8 0	3 8 0	*3 2 3 †2 0 0	2 8 0	2 5 0
Calophyllum kolmarams, each ..	..	..	..	..	..	2 8 0	2 8 0	2 0 0	2 8 0	2 5 0
Acrocarpus kolmarams, each ..	..	..	..	..	..	..	6 0 0	6 0 0	..	
Hopea kolmarams, each	..	..	..	..	..	..	..	6 0 0	..	..

* From the Silent Valley.

† From Chenat Nair reserve.

226. The prices obtained from the South Indian Railway Company for broad gauge and metre gauge sleepers delivered F.O.R. Olvakkot or Melattur have been as follows :—

Description of produce.	Prices obtained.				
	1928–29.	1929–30.	1930–31.	1931–32.	1932–33.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Mesua broad gauge sleepers, I class ..	8 8 0	8 4 0	8 4 0	7 12 0	7 12 0
Do. II, class ..	5 11 0	5 8 0	4 0 0	5 3 0	..
Mesua metre gauge sleepers, I class ..	3 0 0	3 0 0	3 0 0	3 2 0	3 2 0
Do. II class ..	2 0 0	2 0 0		..	..
Xylia broad gauge sleepers, I class ..	..	..	8 0 0	7 12 0	7 12 0
Do. II class ..	..	..	3 0 0	3 2 0	3 2 0

227. The prices realized for the timber extracted from the Chenat Nair Reserve during the era of intensive timber fellings and logging between 1920 and 1930 are exhibited in the statement below :—

Sale prices of the Chenat Nair Exploitation Division.

Kind of timber.	Sale price per c.ft.								
	1919–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
			RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
(*a*) Timber for Kolar Gold Fields, f.o.r. Olavakkot—									
Mesua ferrea ..	..	..	2 6 0	..	..	..	..	..	..
Palaquium ellipticum	..	..	1 2 0	1 2 0	..	..	..	..	..
Homalium zeylanicum	..	..	1 2 0	..	..	..	..	..	..
Cullenia excelsa ..	..	..	1 0 0	..	..	..	..	..	..
Calophyllum elatum.	..	..	1 7 0	..	..	..	..	..	..
Palaquium poles ..	..	..	0 15 0	..	..	..	..	..	..
Miscellaneous ..	..	..	1 2 0	..	..	..	..	..	..
(*b*) Timber for other Companies—									
Mesua, *Palaquium* and *Cullenia* scantlings	..	..	..	1 8 0	..	..	..	..	..
Miscellaneous ..	..	..	0 9 0	0 9 0	..	..	..	..	..
Do. ..	..	..	0 6 8	0 6 8	..	..	..	..	..
(*c*) Sawn scantlings—									
Teak	..	..	..	..	..	..	2 5 3	3 14 7·3	3 3 1
Dalbergia latifolia ..	..	..	..	..	3 15 0	..	4 7 6	..	..
Hopea parviflora ..	..	..	..	..	..	..	3 1 5	..	..
Xylia xylocarpa ..	..	..	..	..	..	..	1 10 3	..	..
Terminalia tomentosa.	..	..	..	..	..	..	2 0 5	3 7 5	5 8 0
Artocarpus hirsuta ..	..	..	..	..	..	..	1 8 7	4 0 5	..
Cullenia excelsa ..	..	..	..	1 8 0	..	..	1 8 8	..	..
Machilus macrantha ..	..	..	..	..	..	..	2 11 1	..	..
Albizzia odoratissima.	..	..	..	..	..	..	1 8 0	2 15 0	2 10 10
Pterocarpus marsupium	..	..	..	..	..	..	2 15 0	4 11 11·9	..
Terminalia paniculata.	..	..	..	..	..	2 15 2	1 12 5	2 13 7	3 0 8
Cedrela toona	..	..	..	..	..	..	..	3 15 11·6	..
Dysoxylum malabaricum	..	..	..	..	..	4 7 11	3 3 8	..	..
Acrocarpus fraxinifolius	..	..	..	..	2 0 0	2 15 8	2 0 2	..	..
Lagerstrœmia lanceolata	..	..	..	..	..	2 14 9	1 6 3	2 12 2	2 12 8
Mesua ferrea	..	..	..	1 8 0	..	3 0 11	1 9 4	..	..
Palaquium ellipticum.	..	..	..	1 8 0	..	2 5 10	1 7 3	..	..
Grewia tiliæfolia ..	..	..	..	..	..	2 12 1	2 5 10	2 10 8	2 10 3·4
Homalium zeylanicum.	..	..	..	..	0 8 0	2 2 7	1 8 6	..	..
Calophyllum elatum ..	..	..	..	..	1 8 0	2 11 7	2 13 2	3 9 0	3 15 2
Polyalthea fragrans ..	..	..	..	..	..	4 7 8	..	..	..
Bischofia javanica ..	..	..	..	..	..	2 6 8	1 8 1	..	..
Miscellaneous ..	..	..	..	..	0 6 0	2 1 5	1 9 6	..	..
Sawn scantlings, I group	..	..	..	..	..	..	..	2 12 3·5	1 6 0
Sawn scantlings, II group	..	..	..	..	..	..	..	2 8 9·6	1 6 9

Sale prices of the Chenat Nair Exploitation Division—cont.

Kind of timber.	Sale price per c.ft.								
	1919–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Sawn scantlings, III group	..	..	..	..	..	..	..	3 8 3·6	1 6 8
Sawn scantlings, special	..	..	..	..	..	8 9 7	8 6 9	3 14 8·6	..
Boards—Binny's	..	..	..	..	..	2 3 9	2 7 7	1 11 6·6	..
Boards—Others	..	..	..	..	..	1 0 8	1 0 2	1 1 0·9	..
Reepers 2″ × 1″	..	..	..	..	..	1 2 1	1 1 5	2 7 8	2 12 2
Boxes	..	..	..	..	..	..	..		
Ceiling and flooring boards—									
I group	..	..	..	..	..	..	..	3 11 3·4	..
II group	..	..	..	..	..	..	..	3 7 6·3	..
III group	..	..	..	..	..	..	..	4 4 9·1	..
(*d*) Sleepers and kolmarams—									
Mesua ferrea, broad gauge	..	..	..	..	..	..	2 11 11	..	..
Mesua ferrea, metre gauge	..	..	..	..	..	..	2 0 0	..	..
Xylia xylocarpa, broad gauge	..	..	..	..	..	..	2 10 7	..	..
Xylia xylocarpa, metre gauge	..	..	..	..	..	..	2 0 0	..	..
Teak Broad gauge.	..	..	..	..	..	..	3 3 2	..	..
Teak metre gauge.	..	..	..	..	..	..	2 10 8	..	..
Hopea parviflora broad gauge	..	..	..	..	..	..	3 0 0	..	..
Hopea parviflora metre gauge	..	..	..	..	..	..	2 0 0	..	..
Acrocarpus kolmarams	..	..	..	..	..	..	2 10 7	..	..
Average for sleepers of all species	..	..	..	..	..	2 9 0	2 7 0·6	2 7 1	2 7 2
Average for kolmarams of all species.	..	..	..	..	..	1 11 9	..	..	..
Average for chattams of all species.	..	..	..	..	..	1 9 2	..	..	..
(*e*) Miscellaneous—									
Vittams (beams) all species	..	..	..	..	..	..	1 5 1	..	..
Spokes and felloes	..	..	..	..	..	..	2 2 0	..	..
Average—logs of all species	1 5 0	1 13 9·3	1 11 7	0 6 0·08	1 10 10·9	0 7 4·06	0 2 0	1 12 9	0 13 1·3
Average—mill sawn scantlings	..	..	..	..	2 1 5·6	2 0 11·12	1 4 5	2 0 9	1 0 6
Forest sawn scantlings.	..	..	..	..	..	2 8 1·35	1 7 11	1 6 1	1 4 5·4

228. The amounts realized by sale of minor forest produce in various reserves are tabulated below :—

Year.	Amounts realized.										Remarks.
	Chenat Nair and minor reserves.			Attapadi Blocks I to V.			Silent Valley and Panakadan.	Attapadi Block VI.			
	RS.	A.	P.	RS.	A.	P.		RS.	A.	P.	
1876–77	80	0	0								
1877–78	200	0	0								
1881–82	100	0	0								
1882–83	250	0	0								
1883–85	181	8	0								
1885–86	117	4	0								
1886–87	50	0	0								
1887–88	353	12	0								
1888–89	15	0	0								
1889–91	402	5	0								
1891–92	526	1	0								
1892–93	317	4	0								
1893–94	715	10	1								
1894–95	556	6	0								
1895–96	1,135	0	0								
1896–97	685	0	0								
1897–98	876	4	0	30	2	4					
1898–99	797	0	0	58	12	4					
1899–00	751	7	9	50	10	9					
1900–01	899	3	0	61	4	6					
1901–02	725	0	0	50	4	10					
1902–03	846	0	0	50	4	6					
1903–04	1,056	0	0	55	0	0					
1904–05	778	0	0	62	0	0					
1905–06	855	0	0	80	0	0					
1906–07	1,175	0	0	175	0	0					
1907–08	700	0	0	135	0	0					
1908–09	..			106	0	0					
1909–10	1,087	0	0	93	0	0					
1910–11	2,500	0	0	605	0	0	..	163	0	0	
1911–12											
1912–13								505	0	0	
1913–14	885	0	0	762	0	0	..	350	0	0	
1914–15	3,700	0	0	135	0	0	..	105	0	0	
1915–16											
1916–17											

Year.	Amounts realized. Chenat Nair and minor reserves.	 Attapadi Blocks I to V.	 Silent Valley and Panakadan.	 Attapadi Block VI.	Remarks.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	
1917–18 ..	2,296 0 0	132 0 0	..	100 0 0	
1918–19 ..	4,200 0 0	450 0 0	282 0 0	117 0 0	
1919–20 ..			233 0 0	170 0 0	
1920–21 ..			241 0 0	250 0 0	
1921–22 ..	3,900 0 0	210 0 0	152 0 0	250 0 0	
1922–23 ..	(a) 71 0 0		160 0 0	250 0 0	(a) Rs. 71 fodder grass.
1923–24 ..	(b) 225 0 0		..	214 6 6	(b) Rs. 225 avaram bark.
1924–25 ..	1,730 0 0	830 0 0	600 0 0	140 0 0	(c) Rs. 100 *Cassia fistula* bark.
	(c) 100 0 0	..	..	..	
1925–26 ..	810 0 0	..	..	200 0 0	
1926–27 ..	850 0 0	..	215 0 0	400 0 0	
	(d) 10 0 0	..	..	..	(d) Rs. 10 *Acacia intisa* bark.
1927–28 ..	1,000 0 0	555 0 0	217 0 0	500 0 0	
	(e) 130 0 0	..	..	..	(e) Rs. 130 avaram bark.
1928–29 ..	625 0 0	700 0 0	325 0 0	Nil.	
1929–30 ..	635 0 0	900 0 0	625 0 0	400 0 0	
	(f) 30 0 0	..	(g) 500 0 0	(h) 1,000 0 0	(f) Rs. 30 *Cassia fistula* bark. (g) Rs. 500 Canes.
1930–31 ..	310 0 0	..	..	500 0 0	(h) Rs. 1,000 Vateria seeds.
	(i) 50 0 0	1,030 0 0	625 0 0	(h) 1,000 0 0	(i) Rs. 50 *Cassia fistula* bark.
1931–32 ..	805 0 0	Nil.	Nil.	115 0 0	

SECTION 6.—PROTECTION OF TIMBER IN TRANSIT.

229. The protection of Government timber in transit is of primary importance in Malabar on account of the incessant exploitation of timber from extensive areas of privately owned forest throughout the division and from the adjoining reserves. The necessity for controlling all timber in transit, Government or private, was recognized when this division formed part of Central Coimbatore and the Timber Transit Rules, Central Coimbatore district, came into force in 1912.

230. Under these rules tannahs were established at Mundur, Olavakkot, and Punnapara in the Malabar district for checking timber in transit, among other regulations.

231. When sleeper operations were started in the Silent Valley in 1928, the tannahs at Mundur and Punnapara were transferred to Melattur and Kumaramputhur on 1st May 1928, to prevent smuggling of timber from the Silent Valley.

232. The Timber Transit Rules for the Central Coimbatore district were in force in the Palghat Division till new rules for this division came into force on 22nd February 1932, under Notification No. 72 of that date.

233. Under the new rules, checking stations are continued at Olavakkot, Kumaramputhur, and Melattur, within the area covered by the working plan, and at Navakarai, Mogamuniappan koil, Pallapalaiyam, Anaikatti and Iruttupallam, in other parts of the division.

234. Proposals for establishing other checking stations will be found under Chapter IX.

235. Since fuel and bamboos are always leased out to contractors, they have been rightly excluded from the operation of these rules.

CHAPTER IV.—STAFF AND LABOUR SUPPLY.

SECTION 1.—THE STAFF.

236. The present headquarter staff of the Palghat Division consists of—

One District Forest Officer	
One Assistant Conservator.	
One Extra Assistant Conservator.	
One Head clerk ..	Permanent.
One Accountant ..	
One Draughtsman ..	
One Typist	
Two clerks	
Two clerks	Temporary.
Six peons	Four permanent and two temporary.

237. The Assistant Conservator is under training and the Extra Assistant Conservator is solely employed in looking after the 'Ponam' Coupes of the Bolampatty Range, outside the working plan area.

238. The Palghat division was formed in 1921 with ten clerks, but the number was reduced to six in 1923 when the major part of the heavy exploitation work, in the Chenat Nair Reserve, was handed over to a newly formed exploitation division. With the increase of work consequent on the inauguration of sleeper extraction in the Silent Valley in 1928-29 and of teak plantations in the Chenat Nair Reserve about the same time, an additional, but temporary, clerk was sanctioned in 1929. Increasing work connected with timber accounts was found to require another hand by 1931; so, with the extension of sleeper operations into the Kalladikode valley of the Chenat Nair Reserve, a second temporary clerk was sanctioned during that year.

239. The staff in the three ranges of the division is distributed as under :—

Designation.	Palghat Range.	Mannarghat Range.	Bolampatty Range.
1 Range Officer	One	One	One.
2 Foresters	Four	Five	Five.
3 Forest guards	Fourteen	Thirteen	Fourteen.
4 Rserve watchers	Eleven	Eleven	Ten.
5 Bungalow watchers	One	....	....
6 Range clerks	Two	Two	One
7 Range peons	One (temporary)	One (permanent)	One (temporary).
8 Tannahdars	Two	Two	Four.
9 Depot keepers	One	Two	....

The full establishment of the ranges is included in the above statement. The whole of Mannarghat Range and parts of Palghat and Bolampatty Ranges are covered by this working plan. With the rearrangement of the Palghat and Bolampatty Ranges suggested in Chapter IX, all the area in the Selection and Protection Working Circles except the shola part of Bolampatty Block II, will be in the Mannarghat and Palghat Ranges.

240. Both the Palghat and Mannarghat Ranges have two range clerks each at present. One clerk in each range is permanent; the other is being charged for under 'works,' having been entertained on account of the increase of work due to sleeper operations.

241. There are two tannahs, at present, within the area covered by the working plan—one at Olavakkot and the other at Kumaramputhur.

242. Three depot keepers, paid from 'works,' have been appointed to look after the depots at Olavakkot, Mannarghat and Melatur.

243. The overhead charges of the Range Officers and their offices and the District Forest Officer and his establishment are being distributed at present as under :—

	PER CENT.		PER CENT.
Range Officer, Palghat—		District Forest Officer—	
Walayar	33·3	Sleeper operation, Chenat Nair	25
Chenat Nair sleeper operations	33·3	Regeneration, etc.	10
Chenat Nair regeneration, etc.	33·3	Do. Walayar	10
Range Officer, Mannarghat—		Sleeper operations, Mannarghat Range	25
Sleeper operations	50	Cultural operations, Bolampatty range	15
Other works or reserves	50	Thadagam reserves	10
Range Officer, Bolampatty—		Attapadi I to VI	5
Attapadi Block VI	5		

244. The existing staff is being worked to its full capacity. Future proposals in regard to the establishment, and the redistribution of staff that will be necessary as a result of the reconstitution of the Palghat and Bolampatty ranges, will be considered in Chapter X.

SECTION 2.—LABOUR SUPPLY.

245. (1) *Chenat Nair and surrounding reserves.*—The adjacent amsams of Mundur, Noochipulli, and Agathethara supplied the large labour force required during the extensive exploitation schemes that prevailed in the Chenat Nair reserve from 1920-30. There is thus no dearth of labour and even in the agricultural season (May to November), sufficient labour for ordinary forest works can be obtained.

Sawyers and dragging coolies are obtainable at Kalladikode, about 10 miles from Palghat; they are well acquainted with the area, as they were engaged by the Forest Exploitation Division, for the conversion of sleepers and kolmarams.

The usual wages, till last year, were 8 annas per man, 6 annas per woman and 4 annas per boy, for ordinary works. Owing to reduced cost of living, the current wages are less by one or two annas, in each case.

Attempts to maintain a labour force at Sappal or Dhoni, have failed, owing to the prevalence of malaria. The coolies come up from the plains every day, resulting in shorter working hours and a fatigued labour force, and hence increased working costs.

246. (2) *Silent Valley, Panakadan and Attapadi Blocks I to VI.*—The villages at the foot of the hills, Thiruvazhamkunnu, Bhimanad, Kumaramputhur, Kottopadam, Thatchampara, Kalladikode, etc., have supplied axemen, sawyers and dragging coolies for the past several decades to timber traders exploiting the extensive private forests in the vicinity of these reserves. They have thus developed considerable skill, in these operations, the Kalladikode sawyers, particularly, having earned a reputation extending beyond the Malabar district.

The dragging coolies, many of whom are Mappillas, are usually men of good physique, firm of foot and quick of eye and their muscles are trained by constant use for the arduous and sometimes dangerous work they perform. Most of them are below 40 years of age.

Many of these sawyers and dragging coolies are in debt to one or other of the private timber traders and unless they are provided with more or less continuous work throughout the year, it might be difficult to retain them; in fact, it was with some difficulty that they were first prevailed upon to work for the Forest Department.

247. The sawyers also fell the trees they convert. They camp in the forest for ten days or a fortnight at a stretch, returning home for 3 or 4 days at the end of each camp. They work all through the year, except for short periods in the monsoon when the rains are heavy and incessant. The trees are converted at stump site.

248. Felling and conversion in the evergreens are paid for as follows :—

	RS.	A.	P.		
Mesua broad gauge sleepers	1	8	0	each.	
Do. metre gauge sleepers	0	12	0	,,	
Palaquium or *Calophyllum* kolmarams ..	0	11	0	,,	(Scantlings 15′ × 6″ × 4″).
Palaquium or *Calophyllum* chattams ..	0	5	6	,,	(Scantilngs 10′ × 6″ × 3″).
Hopea kolmarams	1	0	0	,,	
Do. chattams	0	8	0	,,	
Felling, logging and rough-squaring ..	0	2	0	c.ft.	(Kalladikode valley).

249. The dragging coolies prefer to rise very early, long before dawn, and are at the top of the hill by 7 a.m. usually.

The dragholes are then prepared, the canes tied on, the sleeper carried on the head where necessary, and then dragged down the slopes to the depot at the foot of the hills (to the head of a cart-track) before 3 p.m. Two men are required for one broad gauge sleeper, while a metre gauge sleeper, or a kolmaram, is handled by one man.

When the lead is too far for a day's drag, as is often the case in private forests, the coolies camp in the forest, carry and drag the timber to a convenient depot from which it is a day's drag down to the cart head, and then complete the drag, as usual, in a day, without camping in the forest.

Both the sawyers and the dragging coolies are paid according to outturn, for the number of passed sleepers (or kolmarams or chattams) converted at stump site, or delivered at the depots agreed upon, respectively.

The dragging coolies are paid according to the lead and the difficulty of extraction; the rates vary from Rs. 1–8–0 to Rs. 2–8–0 or Rs. 3 per broad gauge sleeper. The rate is usually so adjusted as to enable a coolie to earn 12 annas to Re. 1 per day.

250. When felling operations commence in Attapadi Block VI and the sholas of Bolampatty Block II, all conversion and dragging work will have to be done by coolies from the Malabar district, and a large part of the material from Attapadi Block VI will have to be extracted through Malabar. Coolies from Coimbatore are not likely to be available for the purpose, nor are they conversant with the required type of work.

251. In addition to the sawyers and dragging coolies, unskilled labour is readily available for any kind of forest work. In fact the locality has supplied forest labour to Mount Stuart, New Amarampalem and the Anamalais, for some years past, in addition to

meeting the demands of the rubber, tea and coffee plantations in the neighbourhood. Now that several rubber plantations have been practically closed down, the labour market is easy.

The coolies are habituated to camping in the shola forests, and malaria is not virulent, except round Chindaki in the Attapadi Valley.

The usual daily wage for ordinary forest works is 8 annas per day, but owing to the fall in the cost of living, coolies have been available from last year at 7 annas.

252. (3) *Bolampatty Block II.*—For ordinary forest work, Irula coolies from the settlements of the Bolampatty range will be readily available ; for felling, conversion and dragging, Malabar coolies will have to be requisitioned.

253. (4) *Settlements of hill tribes.*—When Attapadi Blocks I to VI were reserved, the hill tribes living within the reserves were permitted to continue their cultivation and to reside within, as mentioned already in paragraph 36.

At the time of writing, the adult population in these villages consists of—

Village.	Adult males.	Adult females.	Village.	Adult males.	Adult females.
Todiki	18	16	Sundanari	7	6
Kadukumanna	6	4	Gottiakhandi	4	5
Anavoi	5	4	Kurukattikallu	7	5
Thadikundu	11	10	Muthikulam	8	3
Murigalai	11	7	Total ..	**77**	**57**

This labour is available for all forest work, that being one of the conditions upon which they have been permitted to reside within the reserve, as a concession, after forest settlement.

The daily wage for a man from these hill tribes has been fixed at 5 annas for a full day, and 3 annas for a half day, under the lease granted for temporary cultivation inside the reserved forest.

A large part of this labour force will be available for the raising of teak plantations along with " kumri " cultivation, prescribed under the Teak Conversion Working Circle.

Since the Attapadi Valley is very malarious, it is difficult to get labour from the plains to camp in the forest for any length of time. The necessity for keeping the hill tribes reasonably satisfied, needs little emphasis, under the circumstances.

Prescriptions for increasing the existing insufficiently allotted areas for " kumri " cultivation will be found in Chapter X.

CHAPTER V.—PAST SYSTEMS OF MANAGEMENT.

SECTION 1.—GENERAL HISTORY OF THE FORESTS.

254. The process of declaring an area a " reserved forest " under the Madras Forest Act has been more intricate and prolonged in the Malabar district than in most other parts of our Presidency. Instead of claimants to rights over forests notified for reservation being in the position of plaintiffs who have to make out their title, as is necessary elsewhere, it has been held by judicial authority that, in Malabar, it rests on Government to prove, in the first instance, that the forest in dispute is at their disposal.

255. The civil appellate courts appear to have regarded the following propositions as established :—

(1) No forest in Malabar is at the disposal of Government unless acquired by escheat, contract or prescription ; and

(2) all forests not belonging to Government by escheat or contract must be the absolute property (janmam) of some one.

It was useless to plead that the forest was unoccupied, for the inevitable elephant-pit was always forthcoming and was accepted as sufficient proof of occupation. This disability largely accounts for the extensive stretches of privately owned forests in Malabar, and for the small proportion of " reserved forests," which in consequence, are usually more remote, and so less accessible than the former.

256. It is worthy of note that out of the 89,134 acres of reserves in Malabar, with which this plan deals, 29,726 acres (Attapadi Blocks V and VI and a small part of Silent Valley) were *acquired* by Government under the Land Acquisition Act for a sum of Rupees 1,03,694–6–5 and another 13,405 acres (most of the Chenat Nair reserve) became the absolute property of the State by escheat, in the year 1790. The Panakadan reserve, 1,086 acres in extent, was also acquired by escheat.

(*a*) *History up to* 1920.

257. *Attapadi Blocks I to VI.*—The *Madras District Gazette* (Volume I, Malabar and Anjengo) published in 1915 gives some interesting information about the Attapadi Valley. The valley was inhabited by Tamil and Kanarese Goundans, Badagas, Irulars, Kurumbas and other hill tribes, who practised shifting cultivation (kumri) on an extensive scale. Twenty-one "hills" and part of another belonged to Government and the rest were in dispute between three powerful janmis, the Mannarghat Moopil Nair, Palat Krishna Menon and Eralpad Raja. The dispute led to bloodshed in 1901, and was provisionally settled by the Divisional Officer, by the allotment of definite portions of the valley to the disputants. The upper slopes were full of big game including the elephant, and the valley was very feverish. It was seldom visited by Europeans till then, but a coffee estate was in existence and a company had been floated to open up a rubber plantation, probably the present Attapadi Estate. A bungalow built by General Havelock (younger brother of a Governor of Madras of that name) was in ruins in Attapadi Block I. (The present rest-house at Havelock's was built near the ruins.)

"Unscientific forestry, the ravages of the timber-thief, the destructive ponam cultivation fatal to tree growth, the average janmi's anxiety to turn his trees into money with the least possible delay, the Mappilla, in the guise of an honest merchant, removing on payment of kuttikanam, ten times as many trees as he has paid for—all these contributed to the slow but steady denudation of the forests in accessible areas; and these gradually became almost destitute of good timber."

258. As regards the desirability of taking up at least so much of the forests in the valley as was considered to affect the Bhavani river and its tributaries, the opinion of all the forest officers who considered the question was unanimous on the point. Sir Dietrich Brandis, in 1882, laid great stress on the importance of protecting the evergreen forests in the valley (vide G.O. No. 470, Revenue, dated 6th May 1882) and his view was accepted by Government so far as to decide in G.O. No. 313, Revenue, dated 4th May 1886, that action would be taken under section 29 of the Forest Act in respect of all areas really required for the protection of the headwaters of the river. As a result of this order a detailed inspection of the valley was made by Mr. Porter in 1887; and his report will be found printed in G.O. No. 630, Revenue, dated 1st July 1887.

259. Mr. Porter has given a detailed description of the forests of the Attapadi Valley, dividing them into various blocks. The present condition of the "blocks" is little different from the descriptions given by Mr. Porter. He speaks of settlements of hill tribes more or less as existing at present, and of shifting cultivation practised by them. His description of Attapadi Block VI is interesting: the block "forms the southern extremity of the valley. The whole of this is one dense mass of evergreen forest, with no deciduous forest and but little grass-land. At present there is practically no cultivation; a few mudugars have recently emigrated from the Bolampatty Valley, and are now clearing the forest near Pattivasal for ponakad (kumri) cultivation. There is also a deserted coffee plantation belonging to a certain Lalji Sait, close to Pattivasal, and a clearing, said to have been made by General Morgan, in the slopes of the hills between Iyappanmudi and Chinna-Amantamalai.

"The evergreen forests are magnificent and contain finer trees than I have seen in either Nilgiri or Anamalai sholas. The chief value of these evergreen forests lies in their protective powers both as regards attracting and storing water."

260. A short history of the steps taken by Government for the reservation of the headwaters of the Bhavani and its tributaries, in the Attapadi Valley, is contained in paragraphs 12 to 18 of the letter of the Special Settlement Officer, Mr. Mullins, to the Collector of Malabar, quoted in B.P. Forest No. 328, dated 6th August 1900. The following extracts from this letter give some idea of the difficulties of forest reservation in Malabar :—

"In the first place, Government in view of conserving the evergreen forests growing within the water-shed of the Bhavani river and its confluents, in the interests of the Coimbatore district, in 1879, brought Original Suit No. 15 and Appeal Suit No. 100 of 1879, in the Court of the Subordinate Judge of South Malabar and the High Court of Judicature, Madras, respectively, against certain janmis, with a view to ascertaining in whom the janmam title to the lands in Attapadi Valley vested. There were nine defendants in the suits, and in the event Government found themselves, by a process of exhaustion, apparently the undisputed janmi of Blocks II and III notified, under section 4 in 1888, which lay around the sources of the Bhavani river, and since Blocks III b-1, I, III b-2, and IV *a*, *b*, *c* were covered with shola growth and fed the Siruvani river, an important tributary of the Bhavani, Government also notified these areas with a view to the janmam title therein being acquired under Act I of 1894, after the rights thereto had been admitted by the Forest Settlement Officer, under section 10, Act V of 1882.

The latter part of the scheme fell through owing to the janmi asking more than the Government saw fit to give for the land.

The occupancy rights over 500 acres and the grazing and minor rights over 4,000 acres of forests in the valley were bought from one Lieut.-Col. S. P. Scott by Government in 1886, but it was proved in 1893 that the land was the janmam property of the Mannarghat Nair, who declined to recognize Colonel Scott's power to dispose of his rights over the land. Government would therefore appear to have bought next to nothing from Colonel Scott and the amount paid to him was lost.

For the rest, there were 14 claims filed in respect of the four blocks notified, those admitted being such as were put in by the defendants in the original suit filed in 1879 or their assigns. Of these claims, four were admitted and ten rejected ; the last forest settlement order being dated 27th March 1893, and the last appeal being decided in April 1896 ; the blocks now remaining are therefore free of all rights.

No mention has been made of the inhabitants of the villages, the entry of the names of which such as Thadikundu, Jagi, etc., are to be seen on the map. The reason for this omission is that I found on my visit to the valley that these sites are not, by any means, permanent. A village is simply one hut divided into compartments to accommodate the families engaged on ponam cultivation ; the fact that the villages are in the localities on which they are shown this year is a sufficient reason for their not being there when the notification is published. The villages cannot therefore be said to have any claim to easement or proprietary rights over the sites they have selected for temporary residence. No claims to compensation for, or to proprietary right in, the area cultivated have been advanced by the inhabitants. By this procedure no hardship will be inflicted on the jungle people now resident within the Government area in the valley. They will be permitted by the Forest Department to continue their cultivation under that department, in the interests of the department, which requires that the valley shall be inhabited by men who can collect the minor produce, and who, if looked after and prevented from destroying sholai growth, are useful in many ways."

Attapadi Blocks I, II, III and IV were then constituted reserved forests from the 1st September 1900.

261. The proposal for the reservation of Attapadi Blocks V and VI was approved in G.O. No. 647, Revenue (Confdl.), dated 5th March 1908, and as both the blocks belonged to private parties they had to be acquired under the Land Acquisition Act.

Attapadi Block V of 13,160 acres was valued as follows :—

	RS.	A.	P.
6,100 acres of barren, rocky hills at 4 annas per acre	1,525	0	0
4,660 acres of steep hill slopes, bare grass-land or open jungle, the results of clearing for ponam in former years at 8 annas per acre ..	2,330	0	0
2,000 acres of evergreen shola with some valuable trees which, however, are of little monetary value owing to their inaccessibility at Re. 1 per acre	2,000	0	0
400 acres, between Malleswaramudi and the Bhavani along the foot of the hill at Rs. 10 per acre	4,000	0	0
In release of the lease in favour of Kalladi Moidutty	40	0	0
Total ..	**9,895**	**0**	**0**
Add 15 per cent compensation	1,484	4	0
Grand total ..	**11,379**	**4**	**0**

Attapadi Block VI of 15,780 acres was valued as follows :—

	RS.	A.	P.
5,000 acres of the best shola at Rs. 12	60,000	0	0
2,000 acres of second-class shola at Rs. 5 per acre	10,000	0	0
3,500 acres of open grass and grazing land at 8 annas an acre	1,750	0	0
5,280 acres of barren rocky hills at 4 annas an acre	1,320	0	0
Total	**73,070**	**0**	**0**
To Mr. Hamlin in release of a lease of 2,000 acres of forest from the janmi, the Mannarghat Moopil Nair	6,500	0	0
Total	**79,570**	**0**	**0**
Add 15 per cent compensation	11,935	8	0
Add award by mistake	66	4	0
Grand total	**91,571**	**12**	**0**

The forests were notified under section 16 of the Madras Forest Act from 1st September 1912.

262. That the forests in the valley are of primary importance from a protective point of view and that it might not pay to work them commercially, was the opinion held in the beginning. Mr. P. M. Lushington, in his memorandum dated 6th October 1906, has the following remarks to make on this point :—" If we are really to conserve the areas, our cutting must be limited and the most we can expect is to be able to fell mature trees and those sparingly. I do not see why the Forest Department should look only to the commercial side. We are called Conservators, Deputy Conservators, etc., I am of opinion that the first idea of the department should be conservation and the making of revenue is only of secondary importance."

These blocks were reserved between the years 1882 and 1912.

263. A rest-house was built at Muthikulam in 1912–13, an inspection shed at Attapadi in 1914–15, and a rest-house at Chindaki in 1916–17. The rest-house built at Agali in 1913–14 has since been handed over to the Revenue Department.

264. *The Silent Valley Reserve.*—The title of the Government to the whole of the water-shed of the Silent Valley, or the Karimpuzha river above the point where it descends from the mountains into the plains near Mannarghat, was investigated as early as 1847 and it was found that the whole of this water-shed was absolutely at the disposal of Government, and there were no private rights whatever in it. This investigation was followed by grants to planters of about 1,000 acres of land between the years 1847 and 1873 for coffee plantations, subject to rent payable to Government, after the expiration of a prescribed period in each case. The lands were taken up by the planters and worked, but the estates were finally abandoned and bought in by Government in the year 1889 for arrears of Government revenue. The land so granted and subsequently bought in by Government, for Rs. 18–12–0, lay in the upper reaches of the Silent Valley and was known as the Walghat estate.

In 1888 the whole of the water-shed of the Silent Valley or Karimpuzha river was constituted " reserved land " under section 26 of the Forest Act, as " land at the disposal of Government." During the course of reservation of the block as reserved forest under section 16 of the Forest Act, in 1914, there were five claimants for the Silent Valley Block who opposed the reservation. The Settlement Officer dismissed the claims of four of them and in regard to the claim of Messrs. K. P. Raman Menon and K. P. Krishna Menon, it was found correct, which necessitated acquisition of the portion of the valley lying west of Kundipuzha river in S. No. 235 of Kandamangalam and No. 51 of Payyanadam desams of Walavanad taluk, aggregating 785·75 acres.

The land so acquired and added to the block is the southern extremity of the reserve lying in Walavanad taluk, the rest being in Ernad taluk. Nilikal is situated in this acquisition. The value awarded was worked out as follows :—

	RS.	A.	P.
600 acres of shola land at Re. 1 per acre	600	0	0
185·75 acres of grass-land at 4 annas per acre	46	7	0
Total	**646**	**7**	**0**
Add 15 per cent allowance	96	15	5
Grand total	**743**	**6**	**5**

This was finally reserved in 1914.

265. The nearer portions of these forests were worked for *Dysoxylum malabaricum.* The trees were probably sold to a contractor, on payment of stump fees, in 1901–02. A serambi was built at Nilikal in 1907 and the range quarters at Mannarghat in 1909.

The bridlepath from the plains of Malabar to Sispara, which passes Walakad about half a mile north of the rest-house, is believed to have been one of the earliest lines of ingress to the Nilgiris for pack animals. It was constructed long before the reservation of the Silent Valley.

A path from the Walakad rest-house to the Walakad-Sispara bridlepath was made in 1916–17, and the Nilikal-Adivaram path in 1918–19. The second serambi at Nilikal was built in 1913–14. The rest-house at Poochipara was built in 1915–16.

266. *The Panakadan Reserve.*—Rhodes—Morgan writes in 1889 : " The Panakadan is situated on a small rocky hill of about 1,000 acres in extent. The trees in it are deciduous and the growth average, the villagers in the neighbourhood having been in the habit of pollarding the trees for manure for their paddy fields. In 1883 this was put a stop to and a forest guard appointed to look after this forest, which is very isolated. There are a few small hills in the neighbourhood and a considerable tract on the slopes of the ghats, the ownership of which has not been determined yet. Panakadan hill is reserved land and is under special fire protection. It is intended shortly to notify it as a reserved forest." The area became Government poramboke by escheat. It was actually notified under section 16 from the 15th of October 1906. Panakadan Extension I consisting of 2·13 acres of an old teak plantation was added on 1st April 1918 and Extension II, Kottanikunnu, on 15th November 1918.

The Thiruvazhamkunnu cart-track was constructed in 1894–95.

The serambi at Thiruvazhamkunnu was reconstructed in 1915–16. An old serambi on wooden piles was in existence there for many years prior to that date.

267. *The Chenat Nair Reserve.*—The Chenat Nair forest escheated to Government in the year 1790, along with extensive paddy lands. The paddy lands were sold in auction, but Government wisely retained the ownership of the forest. The Madras Railway Company had a lease in them for the working of jungle timbers (teak and rosewood being 'reserved') which expiréd in 1865. The forests were subsequently worked for timber under the licence system and departmentally, but details are not available. In 1873 fellings were discontinued and some planting was undertaken, which proved a failure. In the same year 1,800 acres of adjoining forests were purchased and added to the escheat forests. Departmental working for timber was re-started by the District Forest Officer, Wynad, in 1887, in which year the forests were placed under him. The Kalladikode cart-track was acquired in 1887, the Karimalai rest-house built in 1884–85, and some inspection paths were also made. The area was reserved in 1887.

268. The area was worked under the selection system for timber. Twenty-eight thousand cubic feet were extracted in 1896–97 and 25,502 c.ft. in 1897–98.

Broad guage sleepers of *Xylia xylocarpa, Hopea parviflora* and *Terminalia tomentosa* were extracted under the " selection system," and sold to the Madras Railway Company in 1900–01, for the extension of the railway line to Mangalore. *Xylia* broad guage sleepers were sold for Rs. 3–12–0, *Hopea* for Rs. 4–14–0 and *Terminalia* for Rs. 3–8–0.

The problem of marketing softwoods like *Cullenia excelsa* was investigated in 1900, but nothing appears to have materialized.

Billet fuel was supplied to the Madras Railway Company from coupes in the Chenat Nair and adjoining reserves, worked departmentally, till 1908–09.

Selection fellings were ultimately stopped in 1908–09.

The range quarters at Palghat, and the tannah sheds and other buildings at Punnapara and Olavakkot were built in 1908–09.

In 1909–10, departmental working of fuel coupes was discontinued in favour of working through the agency of contractors.

In 1917–18, Mr. Littlewood prepared a regular working scheme for these forests, under which four fuel felling series were formed. Four coupes were sold in 1918, to various contractors.

At the end of 1919, however, this scheme was abandoned in favour of an intensive timber exploitation scheme.

269. *Puliampalli Tope Reserve.*—In a letter, dated 15th April 1871, from the Forest Ranger, Palghat, to the District Forest Officer, it was stated that this area was planted

with mango, jack, *Pongamia glabra*, teak, tamarind, *Terminalia paniculata* and *Albizzia sp.* some twenty years prior to that date, when it was under the management of the Deputy Conservator of Forests, Anamalais division.

In a progress report for 1874 it was stated that the plantation would be treated as forming part of the Chenat Nair forests and that no further planting would be carried out therein. The area was reserved from 31st July 1897.

The minor produce, mainly mangoes, were leased out every year.

The whole of this reserve, with the exception of 20 teak trees, were clearfelled in1920 and successfully planted with teak, at an espacement of 6½′ × 6½′, by the contractor who purchased the growth.

270. *Dhoni Reserve.*—Reserved from 1894. A few planted teak round the bungalow are about 45 years old now, and must have therefore been planted about 1887.

The Dhoni rest-house was built in 1895–96.

In 1911, three acres round Dhoni bungalow were planted with teak and mahogany. In 1912–18, mahogany and *divi divi* were planted near the bungalow. Sixteen acres were planted with teak, under standards, in 1919, at an espacement of 6½′ × 6½′.

271. *Thampurattipottai Reserve.*—The area was worked for railway fuel in 1883–84, under the coppice with standards system, though it was constituted a reserved forest only in 1897.

It was again worked for railway fuel, under "Coppice with standards", in 1895–96. The revenue realized was Rs. 15–8–0 per acre.

Teak was planted over 20 acres in 1919 but was a failure and the plantation was subsequently written off the accounts. Seven acres of paddy flats were also planted with teak in 1919 but proved a failure.

(*b*) 1920–28.

272. *Attapadi Blocks I to VI.*—During more recent times, from 1920–28, these forests received a great deal more attention, largely owing to the postwar activity in the timber trade. With a view to developing the forests a number of rest-houses and bridle-paths were constructed. These are detailed below :—

A rest-house was built at Aruvamparai in 1925, a serambi at Havelock's in 1925–27 adjoining the site of a previous rest-house, the ruins of which can still be traced, and another at Periananthamudi in 1925–26. Thirty miles of inspection paths were constructed in Attapadi Block VI in 1920–22. The Chindaki-Periananthamudi, Aruvampara-Chindaki, Anamulli-Chindaki, Chindaki-Havelock's and Periananthamudi-Muthikulam paths were made between 1925 and 1927.

273. *The Silent Valley Reserve.*—The Chembotti-Aruvampara path and the Walakad-Poonamalai path were constructed in 1923–24 and 1927–28, respectively. The Poonamalai serambi was built in 1927–29.

274. *The Chenat Nair Reserve.*—The year 1919 ushered in a decennium of intensive timber exploitation in this reserve. The Chenat Nair forests were inspected in August 1919 by Mr. H. Tireman, Acting Conservator of Forests, Western Circle. As regards the lower and outer slopes he expressed surprise that coupes were being sold, standing, at so low a figure as Rs. 115 an acre, animadverted on the dangers of heavy fellings in this forest, considered the possibility of working the deciduous and evergreen portions and determined to commence supplying timber to the Kolar Gold Fields. A supply of 3,000 tons a year was to be attempted. At a rough estimate, Mr. Tireman considered 5,000 acres on the southern slopes, to be easily accessible, and capable of yielding at least 40 tons per acre on the average. The area to be exploited annually was provisionally fixed at 250 acres with an estimated yield of 10,000 tons of timber of various species and 2,000 tons of firewood from the branches, heads and butts of trees felled for timber. The financial forecast provided for a total capital outlay of Rs. 1,70,000, recurring expenses of Rs. 1,11,000, and an annual revenue of Rs. 2,50,000 from timber at 8 annas a cubic foot on the average and Rs. 6,000 from fuel. An annual profit of Rs. 1,45,000 was anticipated and it was considered that the scheme would prove a very paying proposition. In his reference No. 2774/19-1, dated 17th November 1919, the then Chief Conservator, Mr. S. Cox, submitted the scheme for the administrative sanction of Government. It was clear that the estimate was not based on any enumeration survey or stock-taking, or consideration of the prices obtainable for the various species, while the difficulties of extraction were underestimated. It was admitted that there was much that was purely experimental in the scheme and that on the results of the work in the Chenat Nair forests would largely depend the method to be adopted for dealing with the more extensive evergreen forests of Malabar and Kanara. Government

accorded administrative approval to the scheme in G.O. Press, No. 2189, Revenue Special, dated 27th November 1919. The scheme was thus entered upon without a proper study of the contents of the forests as regards volume and species, and without due appreciation of the difficulties to be encountered. With no previous experience of this class of work, the construction of a system of cart and tractor roads, inspection paths, timber slides, depot buildings, and quarters for the labour and staff was taken up. The plant and machinery included two Holt Caterpillar Tractors.

275. Work was commenced in the Dhoni valley and the extraction included four distinct operations : (*a*) Coolie and buffalo yarding from stumpsite to dragpaths or roads, (*b*) hauling or wheeling to head of main slides, (*c*) sliding to the main dump and (*d*) carting to Olavakkot depot.

276. The following roads and dragpaths were constructed :—Four miles of dragpaths, the Sappal Ghat Road, Road from motor shed to Dhoni rest-house, Dhoni-Olavakkot road. The following buildings were erected :—A rest-house, Ranger's quarters, Foresters' quarters, maistri's quarters, and coolie lines at Sappal and a Range Office and Range quarters at Olavakkot.

277. The question of securing an assured market continuously for the timber felled was taken up with the Kolar Gold Mines. A representative of the Mining Board visited the felling area on 5th November 1920. He recommended to the Mining Board that practically their entire requirements in logs and poles, approximately 461,000 c.ft. of logs and 151,000 c.ft. of poles per annum, could be obtained from the Chenat Nair forests. As a result of further discussion between the Chief Conservator, the Conservator, Sixth Circle, the Forest Exploitation Officer and the Mining Board, a provisional arrangement was entered into for the supply of timber till 30th September 1921. The Mines agreed to accept *all* timber felled in the Chenat Nair forests, *irrespective of species*, provided the timber was sound, at flat rates of Rs. 1-4-0 per c.ft. of log and 14 annas per c.ft. of pole. This arrangement was intended as a preliminary step to a more comprehensive and detailed arrangement for the future supply of timber to the Mines, and the Forest Department declared that in order to guarantee future supplies it was even prepared to reserve 5,000 acres in Chenat Nair forests, subject to agreement in regard to the quantity to be supplied and prices. A quantity of 66,412 c.ft. of timber was supplied to the Gold Mines up to 31st March 1922, and after allowing for difference in measurement, a revenue of Rs. 87,345 was realized from the sale. The principal discouragement encountered during the year was the decision of the Kolar Gold Fields' management that only certain species of timber felled in the Chenat Nair forests were suitable. This modification of the preliminary arrangement to accept *all* the timber felled irrespective of species resulted in about 65 per cent of the outturn being thrown upon the department as unsaleable in the market.

During 1922–23 the quantity supplied to the Mines was 62,366 cubic feet realizing Rs. 1,16,034. In 1923–24 there was a further decrease in the supply to the Gold Fields—only 38,606 cubic feet, mostly poles, were sold and a revenue of Rs. 66,478 was realized. At the end of 1923 the Gold Fields entered into a three-year contract with the Mysore Forest Department and thus the market on which the Chenat Nair Scheme was founded was lost.

278. In the meantime, Mr. Martin, the Consulting Forest Engineer to the Government of India, visited the Chenat Nair Forests in March and April 1921 and submitted to Government a report based on the reconnaissance trip, estimating a profit of 75 per cent on an outturn of 21,500 tons per annum at a cost of As. 8–4 per cubic foot and with a capital outlay of Rs. 10,00,000. As he himself said his first inspection was of the nature of a reconnaissance and he accepted as a basis for a first rough forecast the figures supplied to him. These were based on eye estimates and Mr. Martin realized that something more reliable was wanted.

279. The position of the scheme was reviewed in July 1922 by Mr. Martin (a copy of his report was submitted to Government with the Chief Conservator's Reference No. 2135/22-1 of the 19th August 1921) who still considered that in spite of the initial loss, with sufficient capital and operating organization, a steadily increasing profit could be made from the operations each year. The need for thorough investigation and the presentation of estimates on the basis of surveys and detailed examination, instead of short inspections, was emphasized. The decline in the demand from the Kolar Gold Fields was also considered and the advisability of installing a sawmill for utilizing the full yield, a plant for the manufacture of boxes at or near Olavakkot, and a drying kiln for seasoning the softer timbers was also dealt with in detail. The report was recorded in G.O. Mis. No. 1163, Development, dated 2nd September 1922.

280. The work in the Chenat Nair forests originally formed part of the Palghat Forest Division, first under the District Forest Officer and later with a whole-time officer-in-charge. The proposal for the constitution of the Chenat Nair Exploitation unit as an independent charge, separate from the Palghat Division, and in charge of the Forest Exploitation Officer, working under the orders of the Conservator, Sixth Circle, was accepted by Government in G.O. Mis. No. 1130, Development, dated 25th August 1922.

281. The Engineering Branch was also constituted under the orders of Government in G.O. No. 340, Development, dated 5th March 1923, and the two Americans, Messrs. C. S. Martin and J. K. Pearce, were recruited in August 1923 as the Chief Forest Engineer, and the Logging Engineer, respectively. As head of the Engineering branch, the Chief Forest Engineer (with the Forest Exploitation Officer in direct charge) was entrusted with the conduct of the operations in the Chenat Nair forests with which he was already familiar as consulting Forest Engineer to the Government of India. Mapping and enumeration of the areas was commenced under the direction of the Logging Engineer. The enumeration of the Sappal and Elival valleys (completed in 1926) showed that there was actually only one-fourth as much saleable timber as had been originally estimated—work had proceeded for five years without knowledge of what the forest contained though rough estimates had been made year by year for the purpose of preparing estimates for working.

282. The accounts were audited for the first time in 1922, when it was stated that the loss from the date of the inception of the work up to the 31st March 1922 was Rs. 4·52 lakhs or Rs. 1·57 per cubic foot. Mr. George (the auditor) drew attention to the fact that the quantity of timber available was proving to be much below the original estimate and he suggested that it would be well to wait until accurate data were available ; no useful scheme of work was possible until a proper working plan was drawn up. It was necessary to increase the output if better financial results were to be shown and Government required that special efforts be made to secure this object. The loss was attributed by the Chief Conservator to inexperience and faulty supervision—over the period in question the work was done by the District Forest Officer or by an officer with no experience of such work. Clearly a new work of this kind would take time to establish and initial loss need not be viewed with apprehension.

283. The loss continued during 1923-24 and with the loss of the Kolar market, 65 per cent of the production from the Chenat Nair forests was, as mentioned already, left for the Department to dispose of in the open market. The timbers were not in common use and markets had to be established for them. It was suggested that these timbers possessed great inherent value and on the establishment of that value depended the entire proposition of the utilization of the evergreen forests in the Presidency. Investigations were set on foot to determine the uses for which these timbers would be suitable. Samples were sent to Messrs. Parry and Company's mill at Baliapatam and to the Mills at Trichur to be made into boxes and the suitability tested. The only objections to the use for certain classes of box-making were excessive weight and splitting due to insufficient seasoning. Mr. Martin advocated with greater force the installation of a sawmill and box plant with dry kilns at Olavakkot.

284. Plans and estimates for a portable sawmill and box-making machine were called for by Government in their Memorandum No. 2556-I/23-2, Development, dated 3rd November 1923. In view of the urgency, on 13th November 1923, just a week after the receipt of the Memorandum, the Chief Forest Engineer submitted his estimates which were forwarded to Government with Chief Conservator's endorsement No. 9024/23-2, dated 16th November 1923. The estimates required revision due to a serious mistake and revised estimates were submitted to Government in Chief Conservator's Office Reference No. 9024/23-3, dated 4th December 1923. The estimates provided for a mill at a cost of Rs. 82,875 and a drying kiln at a cost of Rs. 16,016 or Rs. 98,891 together. Other capital investments provided for were the log and lumber yard, buildings for the mill and the staff, and the telephone line to Sappal bungalow, at a cost of Rs. 69,050. Including provision for contingencies, the cost of installing the mill and the equipment was estimated at Rs. 1,75,000. The monthly running costs were estimated at Rs. 3,295. Based on a 65 per cent outturn and conversion of 132,000 cubic feet per annum at a cost of Re. 1 per cubic foot, it was expected that the cost of production of sawn material would be Rs. 2–4–1 per cubic foot. A revenue of Rs. 2,37,600 was anticipated from the sale of sawn outturn in the shape of kerosene boxes, scantlings, kolmarams, etc., at the then market rates. The profit for the year was estimated at Rs. 42,218 on the capital investment of Rs. 1,75,000, i.e., 24 per cent. The Chief Forest Engineer was of opinion that the establishment of the mill would not only show a profit in itself but would make the Chenat Nair operations profitable also. Government at first doubted the possibility of the sawmill carrying the losses on the Chenat Nair

scheme and desired that the figures be re-examined. No revision of the figures was considered necessary and in G.O. No. 508, Development, dated 24th March 1924, Government sanctioned the erection of a portable sawmill and box-making plant at Olavakkot together with a semi-portable drying plant. The sawmill was duly set up in 1924–25 at a cost of Rs. 1,90,112. But regular work commenced only in the next year. A large quantity of timber was extracted to feed the mill, but owing to a delay of nearly four months in the delivery of the engines and the consequent delay in setting up the mill, the timber had deteriorated so rapidly that it had to be sold at low rates. Such rapid deterioration was not expected. The estimates of cost of production and the value of the finished product proved to be erroneous.

285. The working in 1924–25 resulted in loss. The Chief Forest Engineer submitted a detailed report in connexion with the audit report for this year in the course of which he explained the situation and pointed out that it would be a great mistake to become discouraged because the scheme could not be expected to be immediately profitable. He also referred to the demonstration of the usefulness of certain species such as *Palaquium ellipticum*, *Cullenia excelsa*, *Acrocarpus fraxinifolius*, *Bischofia javanica* and *Polyalthea fragrans*, which he supposed to be hitherto unknown to the market and to the demand which was being provoked by them.

In his forwarding comments, the Chief Conservator, Mr. H. Tireman, agreed that the operations were undoubtedly serving an exceedingly useful purpose in demonstrating that it was possible to put to good use the immense quantities of timber which had in the past been running to waste. He also pointed out that the Chenat Nair operations were paving the way for reliance on the indigenous timbers—a reliance necessary especially in view of the world famine of timber then anticipated—vide Chief Conservator's Reference No. 5738/25-2, dated 24th September 1925, disposed of in G.O. No. 89, Development, dated 20th January 1926.

286. The sawmill was not yet ready. The Dhoni valley was completely logged by March 1925. A Fordson skidder was purchased, for hauling logs from stumpsite to carthead.

287. In 1925–26 logging operations extended to the Sappal valley.

This was the first year of the sawmill working and the characteristic feature to which pointed attention was drawn in audit was the small quantities of timber sold, namely, Rs. 29,478–15–5 in the form of logs and Rs. 25,798–7–3 in the form of sawn timber and boxes, or Rs. 55,277–8–0 in the aggregate. It was explained that the small sales were primarily due to the extreme difficulty of selling evergreen timber both in the log and in the sawn form especially in a conservative country like India where years of effort and propaganda would be required to popularize the unknown evergreens. The unskilled labour force and the untrained labour staff, an unexpected break down of the driving gear wheel and the cutting of old deteriorated stock lying in the depot impossible to sell in the round, mainly accounted for the poor results. The result of the working was a heavy loss, instead of the profit of Rs. 42,215 anticipated. It was recognized that a new venture of the type dealing with unknown timbers could hardly be expected to prove a financial success in its first year or even in the first few years, and the work was allowed to continue.

The dry kiln was working. *Lagerstrœmia lanceolata*, *Polyalthea fragrans*, *Elaœcarpus tuberculatus*, and *Calophyllum elatum* could be put on the market for motor bus bodies, tea boxes and boards for the railway.

A rest-house and fitters' quarters were constructed at Olavakkot.

288. In 1926–27 the activities of the Forest Engineering branch expanded rapidly. The Sappal Low Road and the Elival road were constructed and the Palamalai road partly made.

The Holt and Fordson skidders were in use.

Sleepers and kolmarams were sawn in the forest, for the first time since the commencement of the exploitation scheme.

The sawmill worked with two shifts, but the supply of box-wood could not cope with the demand.

The dry kilns seasoned some 33,000 cubic feet of timber. Several new species were introduced to trade and a demand created for them.

The Sappal valley was completely logged.

289. The year again showed a loss—the largest—Rs. 2,43,731 in the history of the scheme. The Chief Forest Engineer held the loss to be largely nominal and a fairer method of accounting, eliminating depreciation charges on roads and buildings, leave and pension contribution, and a proper valuation of the closing stock would, it was considered, have reduced

the loss to Rs. 1,26,000. The closing stocks were valued at what "they would fetch" instead of at cost value, the object being that the concern should start 1927–28 with a "clean slate," so far as timber stocks were concerned. That there was a demand for what was produced was demonstrated, but the prices obtained were not remunerative. The material was largely of low value but it was hoped that prices would improve as the woods and their uses became better known. A noticeable fact was the profitable extraction of sleepers and kolmarams and chattams in the forests following the age-long methods of hand-sawing, etc. This class of material cost only Rs. 32,425 to produce and sold for Rs. 43,351.

290. In 1927–28 a twin Fordson overhead cableway skidder with a hauling range of 2,000 feet was received and set up, but the stand of timber was not sufficient to work this to full capacity.

A contract was entered into for elephant yarding of logs to the Karimpuzha, and floating or carting thence to Vachapuram and on to Olavakkot.

Nilambur teak was sawn at the mill to keep it working, on account of the shortage of supply of logs from the Chenat Nair Reserve. The seasoning kiln was remodelled. A wood workshop was installed for making furniture and toolhandles. All boxboards were disposed of.

291. At the commencement of the year the concern, for which a commercial mode of accounting had been adopted all along, was actually commercialized. A working capital of Rs. 1,50,000 was placed at its disposal. The general loss continued during this year also, although the log trading, forest sawn timber trading, and sleeper production and trading, resulted in a profit of Rs. 36,900, the sleeper and hand-sawn timber sides having been expanded. It was, however, considered necessary to keep the concern going until the New Amarampalam scheme was fully examined, and a decision to this effect was arrived at after discussion with the Hon'ble the Finance member, the Hon'ble the Home Member, the Secretary, Development Department, and the Chief Conservator, in February 1928. The question of carrying on the Chenat Nair operations as economically as possible was carefully considered and, as a measure of economy, the working capital of Rs. 1,50,000 was reduced to Rs. 1,00,000 thereby saving interest charges—vide G.O. Mis. No. 1104, Development, dated 6th July 1928.

292. *Puliampalli tope Reserve.*—The teak plantation was kept weeded.

293. *Dhoni Reserve.*—Some sandal sowings were done in 1925, which were successful; the plants may be seen near the well attached to the rest-house.

294. *Thampurattipottai Reserve.*—In this reserve also sandal was dibbled in 1925, but proved a failure.

(c) 1929–31.

295. During the period of postwar activity a great deal of valuable forest was recklessly destroyed in an endeavour to demonstrate the efficacy and economy of American methods of lumbering. These methods proved obviously unsuitable to the conditions prevailing and were clearly at variance with the obligations of Government to maintain the original character of their natural rain forests in the interests of the conservation of water-supplies and prevention of floods and erosion. During the period 1929–31, therefore, a reversion was seen to legitimate systems of forestry, including the maintenance of a sustained yield and the preservation of the natural character of the forests.

296. *The Silent Valley and Attapadi Blocks I—VI.*—As early as 1927, the Chief Conservator directed that the possiblity of extraction of timber by selection fellings in the sholas of the Silent Valley and Attapadi reserves be investigated. The Conservator, Working Plans Circle, formulated certain proposals and an enumeration survey was carried out by the Logging Engineer over two sample blocks in the said reserves in 1927. Experimental fellings on the suggested lines were undertaken in 1927–28. The Chief Conservator of Forests inspected the work in April 1928 and directed that a scheme for the exploitation of the sholas be prepared forthwith.

The sanction of Government was obtained in March 1928 and operations in Coupe I of the Silent Valley were commenced in April 1928. Railway sleepers of *Mesua ferrea* and kolmarams and chattams of *Palaquium ellipticum*, *Calophyllum elatum*, *Hopea glabra* and *Acrocarpus fraxinifolius* were extracted. The sleepers were sold to the South Indian Railway.

Coupes II, III, and IV were worked in the Silent Valley in 1929–30, 1930–31 and 1931–32.

297. Several possible routes for the extraction of timber from the Silent Valley and Attapadi Blocks I—VI have been investigated, aligned or estimated for, since 1928.

In 1929, Mr. C. S. Martin, the Chief Forest Engineer, examined the problem, as it affects the Silent Valley, and was of opinion that a road running down the Kundipuzha along its eastern bank, from a point near Walakad to the place where the Chembotti-Aruvampara path crosses the Kundipuzha, was necessary in order to tap the forests on the left bank of this river. The road was to be continued across the river, through Chembotti, to the top of the Kuruli saddle. Down the steep slopes of the Kuruli ghat he proposed a slide, constructed of rejected sleepers and kolmarams and wide enough to take 18″ square logs, which were to be controlled by an endless wire rope with brakedrums at top and bottom. From the bottom of the slide, at Ambalaparai, a road joining up with an existing cart-track to Alanallur would complete the route to the Melatur road.

The sections from the Kundipuzha to the Kuruli saddle and from Ambalapara (the foot of the proposed slide) to Alanallur were aligned, and estimates were framed in 1930, and a 2-foot path was cut along the traces to serve as inspection paths and to ensure that alignments should not get obliterated.

298. The possibility of constructing a road down the Kuruli ghat (instead of the slide proposed by Mr. Martin) or an alternative one down the Olipuzha valley was investigated by Mr. C. J. Van Haeften, but the steepness of the ground, the loose soil, the heavy cost of construction and the likelihood of landslips were all against the proposal.

299. The road along the east bank of the Kundipuzha referred to above, was estimated to cost Rs. 22,500 (9 miles at Rs. 2,500 a mile). A road dam across the Kundipuzha would cost Rs. 2,000 and the road from the Kundipuzha to the Kuruli saddle Rs. 8,000. The controlled slide was estimated to cost Rs. 15,000 and the Ambalapara-Alanallur road, Rs. 18,650. The total cost of the extraction routes proposed amounted to Rs. 66,150.

300. The other route investigated was a road up the Chindaki ghat, from Anamulli into the Panthanthodu valley (Attapadi Block I). This was to be continued up the Panthanthodu valley towards Aruvamparai, the road along the eastern bank of the Kundipuzha, proposed above, meeting it at the saddle near Aruvampara where the present bridlepath crosses into the valley. A trace from Anamulli as far as the entrance into Attapadi Block I was aligned by Mr. VanHaeften in 1930. The length was 11 miles 6½ furlongs and the estimated cost Rs. 33,000. It was thought that the quantity of *Dalbergia latifolia* of large dimensions supposed to exist in the Panthanthodu valley would go a long way towards meeting the cost of this road, but a complete enumeration of the species in this valley revealed only 101 trees above a breast height girth of 7½′, with an estimated gross volume of 10,000 c. ft. This was too small a quantity to pay for the construction of the road, which was, in any case, difficult of construction and expensive to build and maintain.

301. Again, in 1931, Mr. E. S. Dawson, the Forest Engineer, investigated the question of roads in the Silent Valley. His conclusions agreed in the main with those of Mr. Van-Haeften, except that he proposed a bridge across the Kundipuzha, instead of a road dam. His rough estimate for roads in the Silent Valley amounted to Rs. 35,000.

302. Apart from the excessive cost of construction of the proposed roads and slide, any scheme of roads which did not provide for a *through* cart-road from the plains, up the ghats and on to the plateau, necessarily meant the putting together of carts on the plateau and of bringing the bulls (or buffaloes) up the bridlepaths to the roads above. The difficulty of communication involved excessive expense in providing suitable fodder for the draught cattle from the plains, since most of these forests are deficient in a satisfactory fodder grass. This was realized when buffaloes were utilized in coupe II of the Silent Valley for dragging sleepers : straw and grass had to be transported up on head loads for feeding the buffaloes.

303. In 1931, the Forest Engineer investigated the possibility of constructing dry weather roads in Attapadi Block VI also. The possible alignments for two roads were examined. One was along the present bridlepath from Singapara northwards to the junction of the Pambar and the Siruvani, and thence for about two miles along the Siruvani. The other was up the right bank of the Siruvani from the junction with Pambar, until it met the Muthikulam-Singapara bridlepath. The total estimated cost of construction was Rs. 15,750.

304. Since it was impossible to do away with dragging in spite of these roads, and since a *through* road to the plains was not a practical or economic proposition and since fodder supplies for any cattle kept on the plateau for work would be prohibitive in cost, it was finally decided not to build any roads either in the Silent Valley or in Attapadi Block VI.

The timber would be converted at stumpsite into suitable sizes and the methods of manhandling now in use would be adhered to for the present.

305. It was considered desirable to provide through communication between Palamalai rest-house, in the Chenat Nair Reserve, and Attapadi Block VI, through the " Lost Valley "; this would facilitate inspection of the latter valley. A bridlepath connecting the Sappal-Muthikulam path with the saddle above the Palamalai rest house was accordingly aligned by the Forest Engineer, and estimated for in 1931. Its construction has been prescribed under Chapter IX, Part II.

306. *The Chenat Nair Reserve.*—The year 1928–29 was one of uncertainty owing to the change in forest policy. Reports were received from the Forest Research Institute, Dehra Dun, on the utilization of several shola timbers. The Forest Engineer also prepared some useful notes on the utilization of some timbers in the wood—workshop.

The dry kiln continued to work but the main engine of the saw mill ceased work as a result of the breakdown of the crank-shaft. The wood workshop continued to function, but with diminished vigour.

The District Forest Officer's bungalow at Olavakkot was built. A bridlepath to the Palamalai bungalow site and the Palamalai bungalow were constructed.

Mr. E. A. Lasrado was directed to prepare a working scheme for the ' logged ' areas of the Chenat Nair and surrounding reserves; the scheme was sanctioned tentatively by the Chief Conservator, pending the preparation of this plan.

307. The loss of the year, Rs. 45,321 (interest charges included) was the lowest recorded for years. It was due partly to better organization and more economical working; but principally to the profits on log trading, handsawn timber trading, and sleeper extraction. It became increasingly evident that milling could not be made to pay and that the loss could never be compensated for by the hand working and other items, which showed a profit, but which could be conducted without mechanical logging or saw milling. In these circumstances, Government ordered in their Memorandum No. 3205-I-29-1, dated 30th September 1929, that the mill and the mechanical logging be closed down and the concern was placed in liquidation from 5th November 1929.

308. *Financial results.*—The Capital investment of the Government in the Chenat Nair commercial concern stood at Rs. 4,93,959–2–8 on 31st October 1929. The total loss on the concern up to that date was Rs. 9,01,861 excluding interest charges. This does not include the possible loss on the disposal of the assets, which will be known only after the liquidation is completed.

The loss is analysed below :—

Year.	Total loss.	Loss on saw mill, box plant and kiln only.
	RS.	RS.
1921–22	1,12,630	..
1922–23	49,341	..
1923–24	1,24,207	..
1924–25	1,13,586	..
1925–26	1,24,079	88,695
1926–27	2,43,732	1,83,161
1927–28	51,687	97,723
1928–29	13,577	79,444
1929–30	69,022	55,576
Total	**9,01,861***	**5,04,599***

* Excludes interest charges.

It is evident from the above figures that the loss on exploitation continued till 1926–27; afterwards it was compensated for by the profit on the hand-sawing operations, and also by the profit made on log sales and sale of minor forest produce till the end of 1928–29. The loss incurred on the sawmill, box plant and the dry kiln amounted to Rs. 5,04,599. The total profit on account of handsawn operations amounted to Rs. 95,978 up to the time the concern was placed in liquidation.

309. The loss of Rs. 9,01,861, which is exclusive of interest, includes charges such as depreciation on roads, leave and pensionary contribution, and heavy share of the cost of the Chief Forest Engineer's supervision and management. As contended by the Chief Forest Engineer and supported by the Chief Conservator, a fairer method of account should exclude a part of these charges which amounted to about 2·31 lakhs. Clearly depreciation should not be charged on roads in addition to upkeep and it is manifestly incorrect to charge to a work, the results of which are intended to be applied to an examination of similar projects elsewhere, the whole pay of an officer on a temporary basis. But in any event fairer accounting could not have resulted in anything but considerable loss.

310. The following statement shows the cost of production of logs and milled timber with the percentage of outturn obtained, and the average sale rates realized in the several years from the inception of the scheme to the date of liquidation of the concern :—

	Logs.			Sawn timber.		
Year.	Cost of production including overheads.	Overheads only.	Average sale rates realized.	Percentage of outturn.	Cost of production.	Average sale rates realized.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	RS. A. P.	RS. A. P.	RS. A. P.		RS. A. P.	RS. A. P.
1922–23	2 9 8·45	1 5 6·94	1 13 9·31	..	..	..
1923–24	2 8 7·10	1 4 3·4	1 11 7·0	..	..	..
1924–25	1 11 2·29	0 12 11·14	0 6 0·48	..	..	..
1925–26	0 15 6·79	0 3 6·23	1 10 10·8 *	55·6	3 11 1·1	2 1 5·6
1926–27	0 15 5·21	0 3 9·27	0 7 4·06	43·2	3 8 6·97	2 0 11·12
1927–28	1 0 3·16	0 5 6·62	0 1 7·6 †	51·2	2 12 9·7	1 4 4
1928–29	0 15 5·77	0 2 11·86	1 12 9	57·9	2 6 4·51	1 14 5
1929–30	1 2 6·8	0 5 7·7	0 8 3·8	56·0	3 14 11·09	1 8 5

* High grade logs.

† Poor quality logs.

It will be seen from the figures given above that in the case of logs the sale rates were lower than the cost of production except in 1925–26 and 1928–29. In the case of sawn timber neither the percentage of outturn nor the cost of production ever reached the estimated figure of 65 per cent and Rs. 2–4–1 per cubic foot although the cost of log charged to the mill came below the Chief Forest Engineer's estimated figure of Re. 1 per cubic foot in 1925–26, 1926–27 and 1928–29.

311. The financial results of the scheme were thus far different from the forecasts, which were based on no thorough investigation of the forests or the facts in respect of values or on any accurate data. No enterprise of this or any other nature can be expected to pay in its earlier years ; but although it is probable that costs would have been reduced in time there was no doubt that they could never be brought to a point corresponding with selling values. Marketing in log would have entailed less loss than milling and the decision to instal a mill was taken too hurriedly. When the Kolar supply broke down it would, as events show, have been wise to sell in the log while at the same time having certain quantities of the lesser known timbers sawn up in a private mill so as to test the market. But it is not evident that steps were taken to ascertain the value in scantling of the better known timbers. Too much was taken for granted throughout.

312. *Conclusions.*—The concern started as an experiment in exploiting shola (evergreen) species of which nothing was known.

During the first stage logs were extracted to meet a demand in the Kolar Gold Fields and no conversion into scantling was attempted except on a very small scale.

The second stage witnessed the introduction of mechanical means of logging by tractors and utilization by conversion at a sawmill and so placing a finished product on the market.

The third stage, evolved out of stage two by the repeated criticism of the concern as a losing unit, is one in which the concern worked as would a commercial firm, employing the cheapest means of carrying out each operation with a view to one item and one item only, namely, *profit*. It witnessed the introduction of indigenous methods into the operation, viz., hand-sawing in the forest and elephant yarding, also a cutting down of overheads by the employment of contractors to a small extent. It was therefore a combination of many methods of exploitation. It is perhaps a matter for regret that one or two important methods could not be experimented on, viz., aerial ropeways, timber slides, forest railroads or tramways. Experience in such methods would have been valuable. Against this, however, valuable experience has been gained which enables a comparison to be effected between various possible methods which may be required in future schemes for exploitation of forest areas.

313. The following matters attract attention :—

(1) *Health.*—While working in the lower foot-hills malaria was very prevalent. Until 1927subordinates and crew lived in good quarters at Sappal with an excellent water-supply. The height of the settlement was about 1,200 feet.

Despite this, record shows that in some months well over 30 per cent of the time was lost through malaria. Such a loss of time has a direct effect on overhead costs. Not only this, a further indirect loss arises through the subordinate being unable to work at full capacity for some time after he has had fever.

Anti-malarial measures were attempted and considerable sums spent in clearing undergrowth round the quarters to keep down mosquitoes. It was noted, however, that for a period of three years after clearing, at any rate, the incidence of malaria did not appreciably decrease. A special investigation party had extreme difficulty in catching a mosquito at the site of the settlement. This seems to indicate that some factor other than the mosquito was to blame. It has been suggested that an increase of susceptibility to chill consequent on the cool evening wind may have been responsible.

What is important is the fact that malaria has to be taken into consideration in such localities.

In this case the solution was one of despair and subordinates were transferred to the plains and taken out to work in motor buses. After this health improved considerably.

314. (2) The failure to sell logs in quantity throughout the history of the concern is adequate proof of lack of demand for log at the present time. This is a most important factor in dealing with evergreen species and the reason is not far to seek.

After felling, the average evergreen species degrades rapidly due to either fungoid attack, insect attack or to cracking.

Fungoid attack in the case of *Cullenia excelsa* alone cost the concern over Rs. 50,000 in 1925–27 and a very large quantity of useless logs had to be sold for fuel. Other species similarly affected were *Holigarna arnottiana*, *Elaeocarpus tuberculatus*, *Polyalthia fragrans* and *Sterculia alata*. All these species will be rendered useless as good timber if left in the log for over six weeks to two months in a damp climate such as exists on the West Coast.

Palaquium is the worst species so far as cracking is concerned. Cases are innumerable in which a *Palaquium* log felled in the hot weather had developed cracks 10 feet long within ten days of felling.

Palaquium ellipticum and *Cullenia excelsa* are two of the commonest shola species and, where they occur, very often form up to 60 per cent of the stand. The limitations of these species influence considerably any scheme for their exploitation. They must be converted as soon as possible after felling and, if good outturn is to be obtained, should be converted within one month of felling.

315. (3) Experience in mechanical logging has gone to indicate that tractor logging should be used only in areas where country methods cannot be economically applied, e.g., in hill areas with exceptionally steep slopes. Experience showed that elephant yarding in the lower areas was appreciably cheaper than the tractor.

So far as tractor yarding in itself is concerned, little use has been found in hilly areas for the Caterpillar tractor as such. Our Caterpillar tractor has almost invariably been used as a skidder by utilizing the winch attachment. By far the most efficient and economical work has been done by the skidder proper. This is natural. The Caterpillar tractor is primarily designed for haulage and not for skidding. The skidder is designed for the work and does it effectively and quickly.

Even the skidder has its limitation—a limitation which has gone to increase costs at Chenat Nair. Time lost in moving from one setting to another is time wasted so far as outturn is concerned. The more often a skidder has to move, therefore, the more the waste of time.

The number of times a tractor moves is determined by the stand of timber on an area. In this concern we have dealt with stands varying from 200–500 cubic feet of utilizable log per acre. Compare this with the yields of 4,000 to 6,000 cubic feet per acre of conifer forest and it is easy to realize why tractor charges are high. The average yarding costs per cubic foot by tractor are given below including all charges of crew, fuel, oil, spares and depreciation.

		RS.	A.	P.			RS.	A.	P.
1925–26	..	0	3	2	1928–29	..	0	2	3
1926–27	..	0	2	5	1929–30	..	0	4	10
1927–28	..	0	2	8					

These figures form a useful basis for future estimates of cost.

It has, however, been established that it is possible to extract timber from forests of this class by mechanical means; the work was in fact very efficiently performed. But except in the case of the most valuable timbers, as much as a rupee per cubic foot is unjustifiable on log production—vide paragraph 310 above.

316. (4) It has been proved beyond doubt that hand-sawing at site of all produce for which there is a sale, such as sleepers, kolmarams and chattams, is more profitable than carting in log and conversion. This method is practicable under the selection system correctly applied. Such a method therefore helps to maintain the character of the forest and regenerative measures are possible and may be used to increase the quantity of valuable timber in the forest.

Certain species, however, are much easier to sell and make better prices in boards and planks. Some are, in fact, unsaleable as scantling. Hand-sawing of boards and planks is not a good proposition and a mill would seem to be a necessity if we have to cater for this market. Species which are suitable for this class of work are chiefly the soft woods, and some hard woods such as *Calophyllum* and *Dysoxylum*.

Among soft woods which cannot be utilized by sawing at site are *Polyalthia fragrans, Eaeocarpus tuberculatus, Holigarana arnottiana, Myristica attenuata, Machilus macrantha, Sterculia alata, Alstonia scholaris*, and *Bombax malabaricum*.

317. (5) *Communications.*—The use of tractors does not dispense with extraction roads, as the latter are necessary to tap the dumps yarded by tractors. Here again, the poor stand of timber per acre has been largely responsible for high costs. Though it has been proved that the cheapest form of transport in this country is the country cart, overheads due to roads alone amounted to two annas per cubic foot of timber extracted. This is equivalent to Re. 0–3–6 per cubic foot of scantling produced in the mill. With a medium stand of 1,000 cubic feet per acre, the resultant saving to the concern would have been Rs. 10,000 per annum on cost of timber.

318. Nevertheless, the experiment has been useful in that valuable experience has been gained as regards the silvicultural systems and methods of exploitation unsuitable and suitable to the tropical rain forests of the West Coast, and the utilization of previously unknown species.

SECTION 2.—PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS

319. *Attapadi Blocks I to VI.*—Parts of these reserves were heavily 'kumried" or worked by private persons, on a stump fee basis, before their reservation. Illicit fellings in 1909–10 resulted in the extraction of about 13,000 cubic feet of timber of various species from Attapadi Block VI. Except for the lease of minor forest produce, none of these reserves has been worked since reservation up till 1932.

The selection fellings which were started in the Silent Valley reserve in 1928 extended into the Panthanthodu valley of Attapadi Block I in 1932, when felling commenced in Coupe V of the Silent Valley felling series. The details of this working will be discussed below under the Silent Valley Reserve.

320. *The Silent Valley Reserve.*—No history of past working of this reserve is available owing to the destruction of records by the rebels in the Mappilla Rebellion of 1921, but information gathered from Mr. Govinda Krishna Ayyar, a retired ranger, who served for some time in these forests, supports a statement in the Administration Report for 1901–02, that the reserve was worked under the 'Selection system' during that year. It is gathered that only *Dysoxylum malabaricum* was sold to a contractor on a *stump fee* basis. Refuse from past fellings of this species may still be seen in the reserve, which supports this statement. Minor produce appear to have been leased out almost every year.

321. Selection fellings were started in 1928, under which merchantable shola species such as *Mesua ferrea, Palaquium ellipticum, Calophyllum elatum, Hopea glabra* and *Acrocarpus fraxinifolius* were prescribed for felling with a limit of a maximum of three trees per acre. The minimum exploitable girth for *Mesua ferrea*, the chief species exploited, was fixed at 7 feet at breast height and for the other species at 6 feet. No two trees marked for felling were to be within 30 feet of each other.

Felling, conversion and extraction were all executed departmentally. The sleepers were carted to Melatur railway station and supplied to the South Indian Railway Company on contract. The kolmarams and chattams were carted to Olavakkot and sold.

Coupe II was worked similarly in 1929–30.

About this time the market for kolmarams and chattams became dull and extraction costs increased with the increase in lead, so that there was little profit from them. Consequently only *Mesua* sleepers were extracted from Coupe III in 1930–31. The minimum girth limit for *Mesua* was reduced to 6 feet.

Coupe IV was worked similarly for sleepers in 1931–32, but a contractor was forthcoming to extract and deliver the sleepers for passing at Melatur.

322. *The Panakadan Reserve.*—Not worked at all, except for the occasional extraction of wind blown trees.

323. *The Chenat Nair Reserve.*—No records are available regarding the details of working of this forest from the time it escheated to Government in 1790, up to about 1865, beyond the fact that it was leased out to the Madras Railway Company, presumably for the extraction of sleepers, the lease expiring by the end of 1865. It was subsequently worked for timber under the licence system and departmentally, under 'Selection' fellings, off and on, till 1908. These fellings supplied sleepers in 1901–02 for the extension of the railway line to the north of Calicut. Whenever a forest officer felt that the 'fellings' were heavier than the forest could stand, a 'rest cure' was prescribed, as was done by Mr. Gass in 1900–01. But the rest has been all too short as the natural desire of man to experiment often found a readily accessible victim in this block of forest situated close to civilization, within five miles of a railway line, and which Government had acquired at little or no expense.

Bamboo appears to have been leased out in 1906–08.

324. Fuel coupes were started in 1902–03, under the 'Coppice with standards' system, for the supply of hardwood billet fuel to the Madras Railway Company. The fellings were mainly departmental. The contract with the Railway Company came to an end in 1909. In 1909–10 departmental working was discontinued in favour of working through the agency of contractors, the system remaining the same. This continued till 1912–13, by which time nine coupes had been worked. No system seems to have been followed in the demarcation of these coupes, and the size of the coupes varied from 36 to 77 acres. From 20 to 25 standards were reserved per acre, but disappearance of marked standards and substitution of standards of superior species by unmarked inferior species were common and were punished by heavy fines. High prices were obtained as the coupes contained considerable quantities of timber.

325. Mr. P. M. Lushington remarked in 1908–09 that the fellings were too high up the slopes, and that the coupes were too extensive ; he suggested a 15-year rotation.

Selection fellings were stopped by Mr. P. M. Lushington about the same time, as the 'Selection' had degenerated into unregulated fellings, and the market was glutted by timber from private forests.

326. Bamboo coupes were leased out every year from 1910 to 1916 in the Elival valley.

327. In 1917–18, Mr. Littlewood was engaged in preparing a regular working scheme for these forests for the decennium 1918–1928. Four fuel felling series were established by extension into the accessible portions of Dhoni, Puliampalli, Upper and Lower Elival valleys, respectively. In 1918, four coupes were sold to various contractors, one in each series ; they were worked under the old system. The prices obtained varied from Rs. 46 to Rs. 100 per acre.

On account of the very thick growth of creepers succeeding the fellings in this locality, only coppice shoots from fast growing softwoods could survive, the valuable species being killed out. It was therefore proposed to cut out all valuable timber areas from the fuel coupes, and to work the fuel on a 20 year rotation, reducing the four series to two.

At the end of 1919, however, proposals for working the area for fuel were abandoned in Chief Conservator's Mis. No. 526, dated 7th October 1919, in favour of a timber exploitation scheme. Again these accessible forests were made the subject of an experiment, and in this case a disastrous one.

328. The year 1920, then, ushered in a period of heavy timber exploitation, the main object being to extract timber from the shola forests. A contract was entered into with the Kolar Gold Fields for the supply of pit props and timber not well-known to trade, e.g., *Cullenia excelsa, Palaquium ellipticum, Machilus macrantha, Calophyllum elatum, etc.*

329. The method of felling originally proposed was a modification of the 'uniform system.' In evergreen forests where seedlings of valuable species were abundant, all undergrowth and trees with low shade were to be felled, and about a third of the trees in the upper story were to be girdled, the idea being to minimize damage to young advance growth. Where many seedlings were not present, one third of the trees in the upper story were to be felled in the nature of a seeding felling ; the remaining crop was to be removed gradually in three to five years, as guided by the requirements of the young regeneration that was expected to come in.

In the semi-deciduous forest, a selection felling of all trees over 5 feet in girth was prescribed, and *Hopea parviflora* and *Artocarpus hirsuta* were to be artificially introduced by sowing and planting, with the idea of converting these forests ultimately to the evergreen type, as the latter type usually carried a heavier stand than the former.

In the deciduous areas, sound trees over 5 feet in girth were to be felled.

330. These felling rules were found difficult to carry out in practice for the following reasons :—

(*a*) The bigger trees, in their fall, broke many of the adjacent poles and saplings, so that it was considered more profitable to remove the trees of the understorey prior to removal of the big trees,

(*b*) the dragging operations accounted for a good deal of the remaining advance growth,

(*c*) the final fellings prescribed when the young crop was sufficiently established on the ground, meant a return to an area already partially exploited, which meant higher extraction costs and more damage to regeneration.

331. In the interests of keeping extraction costs low and facilitating felling operations the felling rules prescribed above were ignored and the system degenerated into clear-felling and 'logging', i.e., felling over the whole area of all *sound* trees of *marketable* girth.

332. After the formation of the Exploitation division in 1922, a saw mill and seasoning kilns were erected at Olavakot, and up to date American mechanical logging methods were introduced. Several species of shola timber were felled for experimental conversion and seasoning at Olavakot and all pretence at following any silvicultural system was abandoned. Trees were felled and extracted if they were above a breast height girth of about 2½ feet, the primary aim being to reduce production costs by increasing the output of timber that was yarded by the skidders, sawn in the mill and seasoned in the kilns ; and a large volume had to be produced since the capital costs and overheads were heavy. This naturally resulted in the almost complete removal of such of the species, above a girth of 2½ feet, as could be marketed.

333. The Dhoni valley was completely logged by March 1925, and the Sappal valley by March 1927. Logging extended into the Elival valley in April 1927, where it progressed till it was stopped under the orders of Government in July 1929, preliminary to the concern going into liquidation on 31st October 1929. By that time, the bits of shola near Palamalai rest house had been worked by hand-sawing at stump-site for railway sleepers of *Mesua ferrea* and *Hopea parviflora*, while from about 200 acres round the said rest house, such timber as was required for its construction had been felled.

334. Thus closed the eventful period of large scale experiment in the history of the Chenat Nair Reserve. The system of clear-felling and 'logging' was entirely unsuited to this type of forest, but had necessarily to be adopted if mechanical extraction was to be employed. The natural regeneration of valuable species existing on the ground was badly damaged, if not entirely wiped out, as a result of the extraction methods employed and it was impossible to regenerate effectively in this class of evergreen after clear-felling. The scars of this 'experiment' will not be obliterated for several decades to come.

335. Mr. E. A. Lasrado prepared a working scheme for the Chenat Nair Reserve in 1928. Under this scheme, the lower slopes in Dhoni and Elival valleys were to be clear-felled and planted with teak, the existing plantations were to be tended and creepers were to be cut over areas badly infested with them. This scheme was sanctioned tentatively in 1929 ; teak plantations are being formed every year, more or less on the lines prescribed therein, and all existing plantations are being tended.

336. The selection fellings started in the Silent Valley sholas in 1928, were extended into the Kalladikode valley of the Chenat Nair reserve in 1930, a valley not 'logged' by the exploitation division. Coupe I was worked for sleepers of *Xylia xylocarpa* and *Mesua ferrea* and for kolmarams and chattams of *Palaquium ellipticum* and *Calophyllum elatum*, in 1930–31. A few vittams (small scantlings) of *Artocarpus hirsuta*, *Pterocarpus marsupium*, *Dysoxylum malabaricum*, *Grewia tiliæfolia* and *Dalbergia latifolia*, were also extracted from the deciduous area of the valley. Coupe II was worked on the same lines in 1931–32.

337. *Puliampalli tope reserve.*—This reserve was practically a mango tope till 1917–18, and its management consisted in the annual lease of the mango crop. In 1918–19 the growth on the area was sold to a contractor for clear-felling, with the exception of 20 teak trees.

338. *Dhoni reserve.*—This reserve was worked under the 'Coppice with standards' system in 1902–04. It was worked again in the same manner in 1916–17, about 20 standards per acre being reserved.

339. *Thampurattipottai reserve.*—This is a remarkable little reserve, of a net area of 100 acres, which has been worked several times for fuel under the 'Coppice with standards' system. The first time was in 1883–84, the second in 1895–96 (when it realized Rs. 15–8–0 per acre) and the third in 1903–04. For the fourth time it was worked on the same lines in 1913–15 and for the fifth time, again, in 1918–20.

The area fetched about Rs. 64 per net acre in 1913–15 and Rs. 27 per net acre in 1918–20.

SECTION 3.—SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN.

(*a*) *Cultural operations.*

Attapadi Blocks I—VI.

340. No cultural operations appear to have been attempted prior to 1920. In 1920, 400 seedlings of *Eucalyptus paniculatus* and *Eucalyptus soligna,* and 4,500 seedlings of *Vateria macrocarpa, Cullenia excelsa* and *Palaquium ellipticum* were planted round Muthikulam bungalow. Practically all were dead by 1923. The total cost was Rs. 89–12–0.

In 1925, 250 natural seedlings of *Dalbergia latifolia, Pterocarpus marsupium* and other species found in the grassland round Muthikulam were weeded at a cost of Rs. 2–8–0.

The Silent Valley Reserve.

341. In 327 gaps created by the selection fellings of 1928, seeds of *Acrocarpus fraxinifolius* and *Artocarpus hirsuta* were dibbled in patches in April to July 1928, after loosening the soil. Failures were resown in 1929 when the young seedlings were also weeded. In March 1929, a fire destroyed a few patches of seedlings.

In March—June 1929, 1,035 gaps were dibbled with the same species, and 64 with seeds of *Hopea parviflora.* A few teak stumps were planted in the clearing round Nilikal serambi, in three felled gaps and in the grassy blank at Chembotti. Casualties of 1928 and 1929 were replaced by dibbling and by planting out excess seedlings from other patches. The seedlings were lightly weeded.

The espacement was about 5′ × 5′.

In all, *Acrocarpus* was dibbled in 21,533 patches, *Artocarpus* in 1,541,*Hopea* in 2,412 and teak in 460 patches. An enumeration in November 1931 revealed that the survivals were, *Acrocarpus* 10 per cent, *Artocarpus* 8 per cent, and *Hopea* 17 per cent of the gaps treated. The seedlings were tended at a cost of Rs. 8 in November 1931. The total cost of the operations in Coupe I was Rs. 423–13–0 by the end of 1931, an average expenditure of As. 4–9 per gap.

Some damage was done to the artificial regeneration by the extraction of sleepers and kolmarams. *Acrocarpus* seedlings in comparative shade did not thrive, and many were also attacked by the defoliating caterpillar of *Terias sylhetana.* It was found that the best *Acrocarpus* seedlings were usually those growing in the centres of gaps where they could get plenty of light. The *Artocarpus* and *Hopea* were small and the locality was obviously unsuitable for teak.

342. Artificial regeneration operations were carried out in the gaps in part of Coupe I and in the whole of Coupe II in 1930–31. *Acrocarpus* was dibbled only in gaps where plenty of light was available, and *Artocarpus hirsuta* in gaps with less light. The smallest gaps were not regenerated artificially. The patches were spaced 9′ × 9′. Some *Hopea parviflora* was also sown, seeds having been obtained from South Kanara. *Acrocarpus* was dibbled in 136 gaps (1,450 patches) *Artocarpus* in 92 gaps (523 patches) and *Hopea* in 102 gaps (546 patches).

Acrocarpus and *Artocarpus* germinated satisfactorily, but *Hopea* was a complete failure, probably because the seeds had lost their germinating power. The seedlings were lightly weeded. Natural seedlings of valuable species were tended in the other gaps.

In July 1931, the survivals were *Acrocarpus* 56 per cent and *Artocarpus* 28 per cent of the gaps treated.

In September 1931, the survivals were tended, as also natural seedlings of valuable species such as *Mesua, Palaquium, Hopea glabra* and *Calophyllum,* in 515 gaps.

The total cost of the operations was Rs. 314–5–0 by the end of 1931, or an average of As. 15–3 per gap.

343. In Coupe III felled in 1930–31, *Acrocarpus* and *Artocarpus* were dibbled in the same manner in May 1931. Some gaps were dibbled with seeds of *Gluta travancorica* received from Tinnevelly. Seeds of *Hopea parviflora* from South Kanara were sown in a few gaps. The espacement was 9′ × 9′. Only gaps where there was plenty of light were thus regenerated. *Acrocarpus* was dibbled in 590 gaps (4,286 patches), *Artocarpus* in 337 gaps (3,577

patches), *Hopea* in 99 gaps (1,283 patches) and *Gluta* in 27 gaps (111 patches). Casualties were replaced in September and a light weeding was done. The survivals in December 1931 were *Acrocarpus*, 70 per cent, *Hopea parviflora*, 98 per cent, *Artocarpus hirsuta*, 78 per cent and *Gluta*, 89 per cent of the gaps treated.

Natural regeneration in gaps not artificially regenerated was tended.

The total cost of the operations was Rs. 385 or As. 5–10 per gap.

344. *Experiments.*—The experimental operations described below were conducted by the writer in the Silent Valley Reserve in the neighbourhood of Neelikal, with the approval of the Conservator of Forests, Working Plans Circle.

The introduction of *Dalbergia latifolia* in the gaps, by dibbling, was tried in 1930, but yielded poor results.

One bag of apparently sound seeds of *Mesua ferrea* was collected in the middle of May 1931, a packet of *Gluta* seeds was received from Tinnevelly in June and seeds of *Dysoxylum malabaricum* were collected on 12th August 1931, when ripe. Fifty one-year old stumps of *Artocarpus hirsuta* were obtained from the District nursery in the Silent Valley.

Six cages, 1½′ × 1½′ × 1′, were made of wooden battens covered by wire netting, for protecting dibbled seeds from vermin.

Ten gaps were dibbled on 18th June 1931 with the seeds mentioned above (except *Dysoxylum*) and some of them were protected by the cages. *Dysoxylum* seeds were sown, in protected and unprotected patches, on 12th August 1931.

The experiments resulted in the following tentative conclusions :—

(*a*) Apparently sound seeds of *Mesua ferrea* collected in May proved to have a low germinating power.

(*b*) Seeds of *Mesua* and *Dysoxylum* are very much subject to destruction by monkeys, vermin and insects, when dibbled in unprotected patches. Young seedlings of *Dysoxylum* are damaged probably by monkeys, for the sake of the cotyledons.

(*c*) Seeds of *Mesua*, *Gluta* and *Dysoxylum* start germinating by the close of the south-west monsoon (in September) though the seeds of the first two were dibbled in June and of the last one in August. Observation of natural regeneration of *Mesua* supports this.

(*d*) Seeds of *Gluta travancorica* do not require to be protected after dibbling.

(*e*) One-year old stumps of *Artocarpus hirsuta* can be planted out in gaps in the holas with satisfactory results.

Panakadan Extension II (Kottanikunnu).

345. An attempt was made in 1920 to regenerate the whole of this reserve through four malasar watchers according to the following scheme :—The four malasar watchers were to be given 16·05 acres of land for permanent cultivation and 5·5 acres for house-sites within the reserve, while the remaining area was to be divided into 13 blocks of 8 acres each. The standing growth was to be disposed of departmentally and each block was to be regenerated in bits of four acres at a time. The area would be cultivated temporarily under ‘ kumri ’ and *Xylia xylocarpa*, *Artocarpus hirsuta* and teak were to be raised in the proportion of 3 : 2 : 1, at an espacement of 6′ × 6′, in amongst the field crop.

Accordingly an eight acre plot was handed over to the malasars in 1920, but on account of the Mappilla rebellion of 1921, nothing could be done.

In 1922–23, one malasan forest guard, the only survivor of the four lessees, was permitted to re-enter the area, but though he cultivated the land, he failed to regenerate it.

In 1923–24 some teak and *Terminalia tomentosa* were dibbled in at 12′ × 6′ and the natural seedlings of valuable timber species like *Xylia*, *Terminalia paniculata*, *Dalbergia latifolia*, *Pterocarpus marsupium* and *Artocarpus hirsuta* were tended.

This scheme thus ended in failure.

346. An area of one fifth of an acre was dibbled with sandal seeds in April 1925, in the eight acre regeneration plot mentioned above, but the operation proved a failure.

347. *Lac culture.*—With a view to investigate if lac can be successfully grown under the monsoon conditions obtaining on the west coast thirteen trees of *Schleichera trijuga* in the Panakadan and Kottanikunnu reserves were pruned in February 1931 by the Assistant Forest Utilization Officer, Mr. Hafiz. Forty pounds of brood lac arrived on the spot on 2nd February 1932 from the Indian Lac Research Institute, Namkum (Bihar). Swarming was in full progress on receipt. The young shoots of *Schleichera* were infected with the brood lac on the third and fourth of February 1932. Mr. Hafiz visited the trees again on 31st May 1932, and found that swarming of the new brood had commenced already, earlier

than anticipated. The crop was harvested and found to yield five times the seed used, a good yield. About thirty pounds of brood lac were used to reinfect the trees. The total cost incurred up to the end of April 1932 was Rs. 38.

The reinfected crop was visited by Mr. Hafiz and the writer on 23rd August 1932 and found to have spread satisfactorily in spite of the monsoon. The experiment is being continued.

The Chenat Nair Reserve.

348. Planting operations in the Chenat Nair escheat forests appear to have been undertaken as long ago as 1872, when about a lac of pits were dug and planted with seedlings of various species, such as tamarind and *Pongamia glabra,* in what is now the Puliampalli beat. About Rs. 2,000 appears to have been spent, in such planting and replacement of casualties, till 1875, when the plantations were written off as failures. The Korma teak plantation of 4·5 acres is a remnant of this planting work and is now about 56 years old.

349. Improvement fellings were conducted in Bamboo coupes I and II of Karimpuzha (Elival) beat in 1906–08.

350. Climbers were cut in 1913 over 120 acres of fuel coupes felled over up to that date.

351. *Lantana.*—A regular scheme for the eradication of lantana from the fuel coupes was prepared by Mr. Littlewood in 1915. Three successive annual uprootings and burnings of the noxious weed, over the same area, was prescribed. The operations were carried on from 1915–19, over about 270 acres at an average cost of Rs. 7 per acre. The scheme was dropped in 1919 with the abandonment of the Fuel Working Circle.

352. *Teak plantations.*—(*a*) In 1918, 16 acres of Puliampalli Fuel Coupe I were cut and burnt, after extraction of saleable produce. About 10 paras of teak seeds were collected in May, scorched, soaked in water mixed with cowdung and sown in a nursery. The seedlings were planted out in the forest in lines 10′ × 10′ in August. The planting work cost Rs. 50—rest of the work being done by subordinates free of cost. Weeding was done in 1919, 1920 and 1921. In 1927–28 badly shaped teak was coppiced by the subordinates free of cost and overtopping inferior species were girdled. The plantation has an average height of 25′ but the stocking is poor. The total expenditure was Rs. 189.

(*b*) In 1919, about 10 acres in the Elival Valley were cleared and planted with teak seedlings at 6′ × 6′, in July, at a cost of Rs. 322. Casualties were replaced and the area weeded in 1920–21. Climbers were cut every year after this date. The plantation has an average height of 55 feet and is a fair success. The total cost up to date is Rs. 610. The area was thinned in 1931 at a cost of Rs. 142–10–0.

(*c*) In 1928, five acres of heavily 'logged' semi-shola in the Sappal valley at an elevation of 1,500 feet were clear-felled and burnt. Seeds of *Acrocarpus fraxinifolius* were dibbled in May at the point of intersection of the diagonals between four future teak stumps. The area was planted with teak stumps at 6′ × 6′ in June 1928. The plantation was weeded, as usual, every year. Enumeration in August 1931 showed a survival of 81 per cent of teak, and there were 280 *Acrocarpus* plants. High wind sweeping down the valley damages the young teak, and the damaged saplings are being cut back from time to time. The total cost up to date is Rs. 117.

(*d*) In the same year 21 acres of heavily logged deciduous forests in the Elival Valley were clear-felled and planted with teak stumps at 6′ × 6′. *Terminalia tomentosa* was dibbled in May in localities inclined to swampiness. The usual weedings were done. In September 1931, the survivals were 76 per cent. The total cost was Rs. 470.

(*e*) In the same year again, four acres in the Dhoni valley were notched with germinating teak seeds at 6′ × 6′. The usual tendings were carried out. Survivals were 95 per cent in October 1931. The total cost was Rs. 91.

(*f*) These plantations were extended in subsequent years, 22 acres being planted in the Dhoni valley in 1929, 22·6 acres in 1930, 19·5 acres in 1931 and 20 acres in 1932. In the Elival and Sappal valleys, 45·5 acres were planted in 1929, 35 acres in 1930, 55 acres in 1931 and 13·5 acres in 1932. Details of cost will be found in Chapter III, Part II.

353. Coupes have been laid out in the Dhoni valley by the writer, for future planting. The area fit for planting in the Elival valley has also been demarcated and the area of the annual coupe fixed.

354. The Elival 1919 plantation was thinned in 1931, at a cost of Rs. 142–10–0. The poles were sold for Rs. 175.

355. *Mahogany plantations.*—About 45 years ago (1885–86) *Swietenia macrophylla* was introduced near Dhoni rest house and in 1919–20 about 40–50 sound trees of over 4 feet in girth were felled, seasoned and utilized and were found satisfactory. Under the mother

trees, and under the neighbouring teak, natural regeneration is profuse, indicating that the species is a good shade-bearer. Plantings between 1911 and 1918 in the Dhoni reserve also gave encouraging results. It was therefore decided to extend the plantations.

(*a*) In 1921–22, 15 acres in Dhoni fuel coupes XI and XII were planted at 12′ × 6′ with mahogany, mango, and *Hopea* under the shade of the existing growth but resulted in failure. In 1922–23 casualties were replaced as also in 1925–26. The plants are being tended every year. The total cost at the end of 1931 was Rs. 942.

(*b*) In 1922–23, ten and a half acres were similarly planted to the north of the Dhoni reserve. The cost is not known.

(*c*) In 1924–25, an area of seven acres of abandoned research plots was planted at 6′ × 6′ with one and a half year old nursery plants of mahogany. In open areas *Terminalia tomentosa* seedlings and stumps were planted out, near the seasoning tank. The results were satisfactory. In 1925, the overhead cover was completely removed, under the orders of the Conservator. This resulted in repeated attacks on the leading shoots of the mahogany by a boring insect.

The mahogany is being tended every year. The total cost was Rs. 791 by the end of 1931.

(*d*) In 1925–26, 14 acres were similarly planted with mahogany. Casualties were heavy and were replaced in 1926–27. The survivals are being tended every year. The total cost by the end of 1931 was Rs. 118.

(*e*) In 1926–27, 50 acres were taken up for planting. The undergrowth was cut and burnt over part of the area prior to planting ; no such cutting and burning was done over another part, and a third portion was already a fairly open area. Planting was done at an espacement of 12′ × 6′, and plants six and eighteen months old were used. The results were satisfactory. The plants are being tended every year. The total cost was Rs. 908 by 1931.

(*f*) In 1927–28, 20 acres were planted with mahogany, the last of the mahogany plantations. Most of this area (with the exception of 3·4 acres) was clearfelled and planted with teak in 1929. The total cost was Rs. 457.

356. Experience of planting this species for six years goes to show that its successful introduction is not so easy as was anticipated at one time. The salient facts which have been established are (*a*) that mahogany requires good shade during the first year, (*b*) that it requires a fairly level area with fresh deep soil, i.e., potential teak ground, (*c*) that the overhead shade over the developing seedling must not be removed too quickly as the seedling will then be attacked by shoot borers and (*d*) that climbers are a menace which should be cut every year. It was therefore decided to discontinue further planting of the species and to restrict attention to the tending of the plantations already formed.

Cultural experiments in ‘ logged ’ areas.

357. The heavy exploitation resulting from the adoption of ‘ logging ’ methods seriously disturbed the conditions of light and humidity necessary for the natural regeneration of shola species. Mr. Fischer, in 1921, anticipating the failure of natural regeneration in these areas, decided to supplement them by the artificial introduction, by dibbling or planting, of species like *Mesua*, *Palaquium*, *Calophyllum* and *Artocarpus hirsuta*. For a start some 20 acres were planted up half with *Artocarpus* and half with mango at an espacement of 6′ × 6′, but without success. Under the impression that the *debris* left after exploitation constituted a serious fire menace and an obstacle to regeneration, he ordered the burning of an area to the west of Naickenpara, now known as “ Fischer's burn.” This resulted in the destruction of all the natural seedlings and saplings, and re-stocking it with cuttings of *Erythrina lithosperma*, prior to the introduction of valuable evergreens, proved costly.

358. *Upper felling area.*—In 1921–22, an area of 189 acres surrounding “ Fischer's burn ” was taken up for artificial regeneration—this was known as the “ Upper felling area.” Pits, a foot cube, were dug at 6′ × 6′ and planted with 6,000 seedlings of *Hopea parviflora*. The results were vitiated by subsequent dragging operations. In 1924–25, natural regeneration of species like *Mesua* and *Calophyllum* was tended. *Palaquium* seeds were sown 6′ × 6′. *Hopea*, *Mesua* and *Calophyllum* seedlings (natural and raised) were planted out at the same espacement. The result was a failure. In 1925–26, lines were cut through the area and 6,000 seedlings of *Artocarpus hirsuta* were planted out but failed almost completely. In addition, about 12 acres, in three different localities, were completely weeded, under the orders of the Chief Conservator and the natural seedlings of valuable species were counted. This proved that there were a sufficient number of natural seedlings of valuable species on the ground and that no artificial regeneration was necessary. In

1926–27, both the natural seedlings and those planted out were tended. In 1927–28, the tending was restricted to a small sample plot in the area. The total expenditure per acre up to the end of this year was Rs. 12–13–2.

359. The poor success attendant on the artificial introduction of *Hopea* and *Artocarpus hirsuta* on the higher slopes of Dhoni valley and of mahogany in the lower areas, demonstrated the seriousness and difficulty of regenerating these exploited areas and in 1923 a classification of felled areas was made under the following heads :—(*a*) Dry areas, not necessarily confined to lower slopes, (*b*) medium areas and (*c*) wet areas, not necessarily confined to higher slopes. It was decided that dry areas should be regenerated with *Xylia xylocarpa, Terminalia tomentosa, Terminalia paniculata* and *Lagerstrœmia lanceolata*, with *Xylia* in the greatest proportion ; the medium areas with mango, mahogany, *Vateria indica* and *Artocarpus hirsuta* ; and the wet areas with *Hopea parviflora* and *Mesua ferrea*. These prescriptions resulted in the following plantations :—

360. *The 'Creeper plot'.*—Area 15 acres, on the eastern slope of Dhoni valley, to the west of the motorshed site at Dhoni. It was called so on account of a mass of *Acacia* creepers on it. In 1923–24 the area was cut and burnt and seeds of *Terminalia tomentosa* were dibbled 6′ × 6′, in June, at 4–6 seeds per stake, and the plants kept weeded. About 50 per cent survived. Casualties were replaced in 1924–25. In 1925–26, the area was underplanted with mahogany. Climbers and interfering species were cut in 1926–27. The total cost was Rs. 1,189 in 1931.

361. *Elival Coupe II.*—Area 8·8 acres, to the north-west of Sappal saddle. In 1921, lines 12′ apart were cut through the growth and seeds of *Vateria indica, Artocarpus hirsuta* and *Hopea parviflora* were dibbled in patches 6′ apart along the lines. A few stumps of *Vateria* were also planted. The germination was satisfactory but most of the seedlings failed to survive the hot weather.

In 1922–23, the survivals were weeded and mulched. In 1923–24, the area was lined and staked at 15′ × 15′ and stumps of *Artocarpus hirsuta* were put in. *Hopea* and *Vateria* were dibbled in July. The seedlings were screened with leaves of the wild palmyra. The result was again disappointing. In 1924–25, the survivals were kept weeded. In 1925–26, *Artocarpus* was again dibbled and about 2,000 seedlings were also put out at 9′ × 9′. And in 1926–27, 3,132 two year old *Artocarpus* and 3,561 natural seedlings of *Hopea* (from the Elival valley) were put out. In September 1927 there were 628 *Artocarpus* and 796 *Hopea* alive. The area is being tended every year. The total cost was Rs. 1,879 out of which Rs. 1,633 were written off, leaving a balance of Rs. 246.

362. *Fischer's burn.*—Nine acres. In September 1920, an area of 9 acres just beyond Naikenpara was planted with natural seedlings of *Palaquium ellipticum* and dibbled with seeds of *Dysoxylum malabaricum*, without success. It was then burned, with the result already mentioned above. In June 1921–22, it was dibbled 6′ × 6′ with seeds of *Hopea, Vateria, Palaquium* and *Artocarpus hirsuta*, under cuttings of *Erythrina lithosperma* put out 12′ × 12′. Seeds of *Cullenia excelsa* were also sown broadcast. All except *Vateria* germinated satisfactorily, but the operation was a failure at the end of the year. Survivals were tended in 1922–23. In the next year according to the orders of Mr. S. Cox, then Chief Conservator of Forests, seeds of *Terminalia tomentosa* were dibbled in prepared patches at 12′ × 9′, in June. Subsequently, under the orders of the next Chief Conservator, Mr. Tireman, *Artocarpus hirsuta* was sown at 15′ × 15′. A few stumps of *Vateria* were also planted. The operations proved a failure. In 1925–26, seedlings of *Artocarpus hirsuta* were planted out, but few survived the hot weather. And finally in 1926–27, seedlings of *Artocarpus hirsuta*, 18 months old and of *Hopea parviflora*, were planted out. An amount of Rs. 3,515–1–0 spent on experiments in the area, was written off in 1926.

The area is being tended every year. The most prominent poles in it at present, however, are those of naturally sown *Acrocarpus fraxinifolius*, which it is believed, appeared shortly after the area was burnt.

An amount of Rs. 90–4–0 has been charged against the area till 1931.

363. *Hopea medium area.*—This is adjacent to the old Forest College Camp site near Naickenpara. In 1923–24, 11·72 acres were sown with *Hopea* at 15′×15′ and 2·09 acres with *Artocarpus hirsuta* at the same espacement. The operation was an almost complete failure at the end of the hot weather. During the next year, 7·5 acres of the area below the Madras Forest College camp site was planted with one year old seedlings of *Hopea* at 12′ × 12′ and the results proved very satisfactory. In 1925–26, trees below 1½ feet in girth were felled and overhead cover removed. In 1926–27 all big trees in the area were girdled. The removal of all overhead cover at such an early stage has resulted in a heavy growth of climbers which strangle the young plants and which have therefore got to be incessantly kept in check. Out of a total expenditure of Rs. 705, an amount of Rs. 387 has been written off, the net cost being Rs. 318.

364. *Hopea* 1925–26.—21 acres. This is in two bits, A, of 7·35 acres, in Elival Coupe II and B, of 13·53 acres, above the Forest College camp site.

In 1924–25, lines 19′ apart were cut through the area, and *Hopea* seedlings were planted along the lines 19′ apart.

In 1925–26, more seedlings were planted, reducing the espacement to 9½′ along the lines. The areas are being tended every year by removal of overhead cover. The total expenditure up to 1931 was Rs. 308.

365. *Hopea* 1926–27.—Area 24 acres. This is in two bits, 18·34 acres to the south and west of the old Forest College site and 5·25 acres below Fischer's burn. Lines 19′ apart were cut through the forest and staked every 9½ feet. *Hopea* seedlings were planted at each stake. The plants were weeded and mulched. Casualties were replaced next year. The area is being tended every year. The total expenditure up to 1931 was Rs. 399.

366. *Tending of natural regeneration in logged areas.*—In September and October 1926, tending of the natural regeneration in the heavily logged areas of the Dhoni valley was undertaken, as an experimental measure. An area of 200 acres was selected, which had passed through logging operations one to five years ago. Natural regeneration of valuable species was found to exist under the shade of quickgrowing soft woods such as *Macaranga roxburghii* and *Trema orientalis*, which were up to 15 feet high. The tending consisted in the cutting away of most of the useless soft woods, except the tallest trees with high crowns. Inspection in March 1927 revealed that the seedlings were not looking healthy. The exposure of the soil and the consequent fall in humidity were not conducive to the health of the shola regeneration. It was decided not to repeat such tending over other areas, for sometime to come. The total cost incurred was Rs. 411.

367. *Cultural operations in gaps in the Kalladikode valley.*—Selection fellings in the Kalladikode valley commenced in 1930 and Coupe I was felled in 1930–31.

Regeneration operations on lines similar to those in the Silent valley coupes were conducted in 1931–32 in the gaps caused by the fellings. *Acrocarpus fraxinifolius*, *Artocarpus hirsuta* and *Hopea parviflora* were dibbled between 26th April 1931 and 5th August 1931. Three hundred and thirty-two gaps (1,655 patches) were sown with *Artocarpus*, 104 gaps (840 patches) with *Acrocarpus* and 20 gaps (114 patches) with *Hopea*. Natural regeneration was tended over small gaps not suitable for artificial regeneration. The cost up to December 1931 was Rs. 159 or Rs. 0–5–6 per gap.

Puliampalli Tope Reserve.

368. In 1918–19 the area was sold to a contractor for clearfelling, with the exception of twenty teak trees. One of the conditions of the lease was that the contractor should plant up at his own cost the whole of the clear-felled area (the whole reserve of 21 acres) with teak seedlings supplied by the department. Accordingly the reserve was planted with teak seedlings at an espacement of 6½′ × 6½′.

An amount of Rs. 157 was spent by the department in the succeeding years for weeding the plantation.

It was thinned in 1930–31 at a cost of Rs. 352–9–0 ; 1,505 poles were felled and sold for Rs. 431.

Dhoni Reserve.

369. A few teak and mahogany appear to have been planted in 1887, some 45 years ago, and are now found round the rest-house. Some *Manihot glaziovii* appear to have been introduced before 1911. The teak was thinned in 1910 and 1917. In 1911 three acres were planted with teak and mahogany. Between 1912 and 1918, half an acre of mahogany and some *dividivi* were planted near the rest-house. In 1916 lantana was uprooted and burnt over the whole of the reserve. In 1919, 16 acres were planted with teak at an espacement of 6½′×6½,′ under standards, which were felled subsequently in 1920. The average height is now, in 1931, 48 feet. Some sandal was sown unsuccessfully in 1918. That dibbled in 1925 was more successful and may be seen near the well. About fifty mahogany trees of over 4′ in girth were felled and seasoned in 1919-20 with a view to discovering the utility of the species. They must have been about 33 years old then. The planks were used in the Sappal bungalow and the Palghat Range office (old).

The 1918–19 plantation of teak was thinned in 1931 at a cost of Rs. 52. The poles fetched Rs. 63.

Thampurattipottai Reserve.

370. Teak was planted over 20 acres in 1920 by the contractor who had the lease of the growth but the plantation was a failure and was written off. Remnants of the plantation may still be seen. Sandal was sown in 1925, but the operation was unsuccessful.

(*b*) *Roads and Paths.*

371. The subjoined statement gives the roads and paths inside the area covered by the working plan :—

Statement of roads and paths in the Palghat Division (within the working pl n area.)

Number and name of road or path.	Situation.	Length.	Date of construction.	Cost of construction.	Cost of acquisition, if any.	Total capital cost or book value.	Amount estimated for annual repairs.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		M. F.		RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	
1 Kalladikode cart-track	Palghat range ..	5 ..	1887–88	2,070 0 0	251 0 0	1,516 6 10	..	Part met by district board.
2 Olavakot-Dhoni road	Do.	5 1	1921–22	45,847 4 5	4,097 4 6	49.944 8 11	500 0 0	
3 Sappal Hill road	Chenat Nair reserve	1 2	1919–21	17,494 0 0	..	17,494 0 0	150 0 0	
4 Tractor road from Sappal to Naickonpara ..	Do.	2 4	1922–25	23,358 15 1	..	..	25 0 0	Cost charged against exploitation.
5 Cart-track from Naickenpara to Anakulam..	Do.	2 3	1920–21	12,441 1 3	..	..	24 0 0	Do.
6 Olavakot-Elival road	Palghat range	8 3	1926–27	63,971 1 6	3,221 6 8	..	50 0 0	All except one mile handed over to district board.
7 Elival-Palamalai road	Chenat Nair reserve ..	7 2	1926–29	39,597 0 0	..	2,223 8 0	250 0 0	Balance charged against exploitation.
8 Spur road	Do. ..	0 3	1927	567 0 0				
9 Bottom road west	Do. ..	2 2	1927	8,697 0 9				
10 Six-foot path from Palamali road to Palamalai rest-house.	Do. ..	1 2	1928–29	1,100 0 0	..	62 8 0	10 0 0	Do.
11 Sappal High road	Do. ..	1 6	1926	15,920 12 6	..	..	50 0 0	Do.
12 Sappal Low road	Do. ..	1 7	1926	10,087 9 6	..	..	45 0 0	Do.
13 Path connecting Sappal High and Low roads.	Do. ..	0 3	..	..	..	..	5 0 0	
14 Ambalamalai road	.. ..	0 4	1926	1,612 5 9	..	..	..	Not maintained.
15 Inspection path from Sappal to Elival ..	Chenat Nair reserve ..	3 2	1922–24	429 9 0	..	429 9 0	40 0 0	3′ path.
16 Road from Dhoni motorshed to Dhoni rest-house.	Chenat Nair and Dhoni reserves.	1 0	1920	2,642 4 3	..	2,642 4 3	20 0 0	
17 Velladam shola path	Chenat Nair reserve ..	5 1	1925–26	1,040 4 7	..	1,040 4 7	50 0 0	
18 Sappal-Muthikulam path	Chenat Nair and Attapadi VI	18 4	1923–27	6,201 2 5	184 1 6	6,385 3 11	200 0 0	5′ wide in reserved forest and 2′ in private forest.
19 Inspection paths in Attapadi Block VI ..	Attapadi VI	30 0	1920–22	2,055 2 0	..	2,055 2 0	125 0 0	2′ path.
20 Perianantamudi-Muthikulam path ..	Do.	4 0	1925–26	1,788 10 4	..	1,788 10 4	50 0 0	5′ path.
21 Chindaki-Kakki-Perianantamudi path ..	Private forests, Mannarghat range.	11 2	1926–28	1,309 13 2	240 11 1	1,550 8 3	74 0 0	2′ path.
22 Chindaki-Aruvamparai path	Private forests and Attapadi Block I.	11 6	1925–27	3,658 9 2	47 13 5	3,706 6 7	30 0 0	5′ path in reserve. 2′ path in private forests.
23 Anamulli-Chindaki path	Private forests, Mannarghat range.	7 6	1926–27	1,212 6 4	80 4 4	1,292 10 8	30 0 0	2′ path.
24 Chindaki-Havelock's path	Private forests and Attapadi Block I.	6 2	1925–26	1,370 0 0	18 2 9	1,388 2 9	25 0 0	5′ path.
25 Anaikatty-Murigalai foot-path	Attapadi III and V ..	4 6	..	..	..	..	15 0 0	Not constructed old paths being maintained.
26 Aruvampara Panthan-thodu elephant path	Attapadi Block I	5 0	..	..	..	..	15 0 0	
27 Yedavani-Todiki path	Attapadi Block V ..	5 4	..	..	..	..	17 0 0	
28 Gottiakhandi-Todiki path	Do.	8 0	..	..	..	..	26 0 0	
29 Aruvamparai-Poonamalai-Havelock's path ..	Attapadi I and Silent Valley	9 4	1925–26	1,204 4 0	..	1,204 4 0	30 0 0	
30 Cholakal-Walghat path	Silent Valley	6 4	1907–08	159 12 0	..	159 12 0	55 0 0	
31 Walghat Sispara path	Do.	5 0	1909–10	128 7 0	..	128 7 0	25 0 0	
32 Path from Walghat to Walghat-Sispara path	Do.	1 0	1916–17	300 0 0	..	300 0 0	10 0 0	2′ path.
33 Walghat-Poochipara path	Do.	8 3	1910–11 1916–17	1,611 8 0	..	1,611 8 0	30 0 0	Full actuals notknown.
34 Nilikal-Poochipara path	Do.	5 2	1914–15	1,480 0 0	..	1,480 0 0	20 0 0	5′ path.
35 Nilikal Adivaram path	Private forests, Mannarghat range.	3 7	1918–19 and 1920–21	1,900 0 0	..	1,900 0 0	50 0 0	2′ path
6 Chembotti-Aruvampara path	Silent Valley and Attapadi Block I.	4 2	1923–24	1,244 15 6	..	1,244 15 6	20 0 0	5′ path.
7 Walghat-Poonamalai path	Silent Valley	14 0	1927–28	1,559 15 0	..	1,559 15 0	90 0 0	2′ path.
38 Path from Poochipara to meet No. 37 ..	Do.	4 0	1929–30	320 0 0	..	320 0 0	20 0 0	Coelho path.
39 Ambalapara to foot of Kurli Slide and through Chembotti to Kundipuzha.	Private forests and Silent Valley.	7 4	1929–30	335 12 0	..	335 12 0	10 0 0	2′ path.
40 Thiruvazhamkunnu cart-track	Private land, Mannarghat range.	2 6	1894–95	250 0 0	..	250 0 0	50 0 0	

(c) *Buildings and Wells.*

372. The following statement exhibits the buildings and wells within the area covered by the working plan :—

Statement of buildings and wells in the Palghat division (within the working plan area.)

Serial number and name of building.	Situation.	Date of construction.	Capital cost including acquisition, if any.			Amount required for annual repairs.			Remarks.
			RS.	A.	P.	RS.	A.	P.	
1 Rest-house and out-house, Dhoni ..	Dhoni Reserve	1896–97	971	0	0	20	0	0	
2 Subordinates quarters, Dhoni ..	Do.	1919–20	2,684	13	0	20	0	0	
3 Well at Dhoni	Do.	Do.	709	0	0	5	0	0	
4 Ranger's quarters, Sappal	Chenat Nair Reserve.	1921	5,235	0	0	25	0	0	
5 Foresters' quarters I, Sappal ..	Do.	1922	4,194	0	0	15	0	0	
6 Foresters' quarters II, Sappal ..	Do.	Do.	3,464	0	0	15	0	0	
7 Forest guards' quarters, Sappal ..	Do.	Do.	5,328	0	0	20	0	0	
8 Rest-house, Sappal	Do.	Do.	13,936	0	0	50	0	0	
9 Maistri's quarters, Sappal	Do.	Do.	3,618	0	0	15	0	0	
10 Coolie lines, Sappal	Do.	Do.	6,422	0	0	20	0	0	
11 Petrol and store shed, Sappal ..	Do.	1928–29	375	0	0	..			
12 Rest-house, Palamalai	Do.	1929	2,806	5	8	50	0	0	
Pipe line for same	Do.	Do.	547	10	0	..			
Furniture, crockery	Do.	1931	500	0	0	..			
13 Tanah shed, Mundur	Palghat range.	1908–09	134	0	0	5	0	0	
14 Tanah shed, Punnapara	Do.	Do.	135	0	0	5	0	0	
15 Inspection shed, Punnapara ..	Do.	Do.	144	14	0	5	0	0	
16 Subordinates' quarters, Punnapara	Do.	1912–13	1,095	0	0	10	0	0	
17 Range office, Palghat, with out-house	Do.	1904–28	1,016	2	0	20	0	0	Used by Research Ranger.
18 Tanah shed, Olavakkot	Do.	1908–09	135	0	0	5	0	0	
19 Range office, Olavakkot	Do.	1922–27	4,594	15	0	15	0	0	
20 Rest-house, Olavakkot	Do.	1925	1,329	0	0	15	0	0	
21 District Forest Officer's residence, Olavakot, with out-houses.	Do.	1928–29	17,794	9	0	175	0	0	
22 Fitter's quarters I, Olavakkot, used as forest guard's quarters.	Do.	1925	1,705	0	6	20	0	0	
23 Fitter's quarters II, Olavakkot, used as forest guard's quarters.	Do.	1925	1,705	0	6	20	0	0	
24 Range clerk's quarters, Olavakkot..	Do.	1928	1,700	0	0	15	0	0	
25 Range officer's quarters, Olavakkot	Do.	1922–28	9,379	0	0	30	0	0	
26 Depot keeper's quarters, Olavakkot	Do.	1928	325	14	0	10	0	0	
27 Buffalo shed, Olavakkot	Do.	1930	200	0	0	5	0	0	
28 Well at Olavakkot	Do.	1931–32	416	8	0	..			
29 Rest-house and out-house, Muthikulam.	Attapadi Block VI	1912–13	2,607	12	0	20	0	0	
30 Serambi, Perianantamudi	Do.	1925–26	2,769	4	0	25	0	0	
31 Rest-house and out house at Chindaki	Mannarghat range.	1916–17	4,068	9	0	30	0	0	
32 Inspection shed, Attapadi	Do.	1914–30	991	7	0	10	0	0	
33 Rest-house and out-house at Aruvamparai.	Attapadi Block I.	1925	2,853	0	0	85	0	0	Includes thatching.
34 Serambi at Havelock's with out-houses.	Do.	1926–27	4,187	0	0	35	0	0	
35 Serambi I, Nilikal .. .. .. }	Silent Valley.	1907–08 and	1,530	0	0	30	0	0	
36 Serambi II, Nilikal .. .. .. }	Do.	1913–14							
37 Subordinates quarters, Nilikal ..	Do.	1915–16	800	0	0	15	0	0	
38 Rest-house and kitchen at Poochipara.	Do.	1915–16	3,092	0	0	30	0	0	
39 Rest-house, Walakad	Do.	1925	2,949	6	11	85	0	0	Includes thatching.
40 Serambi, Poonmalai, with out-house	Do.	1927–29	2,877	0	0	20	0	0	
41 Serambi, Thiruvazhamkunnu, with out-house.	Mannarghat range.	1915–16	1,157	0	0	20	0	0	
42 Well at Thiruvazhamkunnu ..	Do.	1915–16	175	0	0	..			
43 Ranger's quarter and kitchen, Mannarghat.	Do.	1909	2,244	10	0	35	0	0	
44 Range office, Mannarghat	Do.	1923–24	2,973	13	3	30	0	0	
45 Well, Mannarghat	Do.	1909–10	435	0	0	..			

SECTION 4.—FIRE PROTECTION.

373. *Chenat Nair and Dhoni Reserves.*—Fire protection appears to have been introduced in a desultory manner in 1876, as amounts varying from Rs. 8 to Rs. 46 have been shown as expended under this head between 1876 and 1885.

Fire protection on approved lines was introduced in 1884–85, fire lines being cleared and burnt all round the reserve except where rivers and sholas formed the bounday "The boundary line is taken as the outer guide line and an inner one about 75 from the outer guide line and about 12 feet wide is cleared and the interspace burnt, so that the whole width of the trace is 100 feet"—(Panchapakesa Ayyar.) About Rs. 450 were spent annually on this operation.

The 12 ft. guide lines widened later to 20 feet. From some time after 1905, in addition to the reserve boundary, 40 feet lines round the old Dhoni, Elival and Puliampalli Fuel Felling series, and also along 6 furlongs of an export road, were also cut and burnt, to a length amounting to some 20 miles: exact dates are not available. Those portions of the reserve boundary passing through sholas and even those bounded by rivers were maintained as fire lines by 1915–16. What was burnt on river boundaries does not appear to have been recorded.

The major portion of the lines round the fuel coupes was abandoned in 1924–25; and all such lines, and the inner 20 feet guide lines for the outer boundary lines, were abandoned from 1925–26, in accordance with an order from the Conservator of Forests.

The total length of the outer boundary line, whether passing through shola or bounded by rivers, is now being sanctioned for fire protection. It should be mentioned here that part of the northern boundary of the Chenat Nair reserve was a cut line till December 1922, after which it has been notified as the left bank of the Karimpuzha.

The final demarcation of the reserve boundary was to a width of 12 feet, but 20 feet width of fire lines have been provided to be cut and burnt; the boundary is often wider than the prescribed 12 feet.

374. *Thampurattipottai reserve.*—The outer boundary was cut and burnt till 1926–27. In this year the subordinates were ordered to early burn the boundary free of cost and this is being done now. Part of the boundary is sheet rock.

375. *Puliampalli Tope reserve.*—The outer boundary was cut and burnt till 1927–28. From this year the subordinates have early burnt the boundary as in the previous reserve. The reserve is bounded mostly by wet or dry fields and by a small stream to the north.

376. *The Silent Valley reserve.*—The boundary lines as originally demarcated were only 10 feet wide, but the permanent demarcation of 1927–28 widened the southern and western boundaries to 20 feet. The portion of the outer boundary bordering on private deciduous forests has been cut and burnt annually, from 1918 onwards, to a width of 40 feet. The line from Aruvampara peak to Nilikal and thence westwards to Vannamparai, and to Cheramankomban (11 miles 6 furlongs), and that portion of it lying for half a mile on both sides of the point where the Cholakal-Walakad bridlepath meets the reserve boundary, are the only portions that are now being taken up for cutting and burning; where the boundary passes through shola on both sides, no fire tracing is done, nor is it necessary. In 1921–23, no fire-protection operations could be carried out owing to the Mappilla rebellion.

377. *Panakadan reserve.*—All the boundaries (9 miles) were cleared and burnt to a width of 20 feet till 1924–25, though the boundary was demarcated to a width of 15 feet only. Two fire patrols were also employed during the fire season, between the years 1917–18 and 1924–25. But in 1925–26, it was realized that only that portion of the north-eastern boundary where it adjoins private forests for a length of about 2 miles, required to be fire traced, the rest of the reserve being bounded mainly by paddy lands. The Mappilla rebels set fire to the whole reserve in 1921–22 and no fire-protection operations could be undertaken during the next year owing to the rebellion.

378. *Attapadi Block I.*—The portion of the southern boundary passing through deciduous forests—viz., from the Bhavani river westwards to where it meets the Panthanthodu, to a length of about 6 miles—was being cut and burnt from 1913–14 till 1923–24. This was extended in 1923–24 as far as Aruvampara peak, so that from that year the whole of the southern boundary from the Bhavani to Aruvampara peak is being fire traced. The width of the boundary as demarcated is 20 feet, but provision is being made for cutting two guide lines each 20 feet wide and 60 feet apart and burning the intervening width of 100 feet.

379. *Attapadi Blocks II to V.*—Only the eastern boundary requires to be fire traced. This is being done since 1912–13 over a distance of 12 miles and a width of 100 feet as in Attapadi Block I. The boundary was demarcated to a width of 12 feet only.

380. *Attapadi Block VI.*—This needs no fire protection, except on the east and north-east, as the other boundaries pass through shola. The eastern boundary is being fire traced as the western boundary of Bolampatti Block II. The north-eastern boundary requires to be fire traced.

381. Statements showing the annual fires are given below :—

Statement of fires in Palghat Range (Area included in Working Plan).

Year.	Cause of fire.	Area burnt in acres.
	(*a*) CHENAT NAIR AND DHONI RESERVES.	
1913–14	Unquenched fire on fire line	36
	From patta land	8
	Do.	30
	Negligent fire tracing	20
	Total	**94**
1914–15	Negligent fire tracing	2
	By minor forest produce contractor	9
	Total	**11**
1915–16	Accidental	20
1916–17	Negligent fire tracing	12½
	From patta land	114
	Total	**126½**
1917–18	By minor forest produce collectors	1·20
	Negligent fire tracing	2·00
	Total	**3·20**
1918–19	From patta land	550
1919–20	From patta land	15
	Do.	4
	Do.	440
	Total	**459**
1920–21	From patta land	½
	Do.	2
	Want of proper care (?)	5
	Total	**7½**
* 1922	Illicit burning of charcoal	35
1923	While tracing fire line	15
	From patta land	8
	Do.	3½
	To induce new flush of grass	50
	Total	**76½**
1924	Accidental	20
	By spark flying from hill	50
	Total	**70**
1925	Cause not known	1
	Do.	40
	Do.	2
	Total	**43**
1926	Supposed to have been done by villagers	20
	From patta land	2
	Carelessness of the staff	¾
	Total	**22¾**
1927	Spread from the adjacent forests.	8
	Not known	5
	Spread from patta land	2½
	Do.	2½
	Do.	1
	Total	**19**
1928	Not known	10
	Do.	12
	Spread from experimental plot.	3
	Total	**25**
1929	While burning rubbish	4
	Throwing beedi butts	20
	Spread from patta land	1
	Not known	200
	Spread from patta land	† 700
	Total	**925**
1930	Not known	23
	Do.	800
	Do.	150
	Do.	10
	Total	**983**
1931	Fire started inside Coupe III from smouldering stumps	**200**
1932	Spread from patta land	5
	Do.	15
	Do.	15
	Do.	5
	Do.	5½
	Spread from the adjacent forest.	5
	Do.	2
	Supposed to be caused by the contractors' coolies	50
	Caused by a fire hidden in a dead tree	45
	Total	**147½**
	(*b*) THAMPURATTIPOTTAI RESERVE.	
1915–16	Cause not known	**4**
1920–21	By contractors' men	**40**
1922	Spread from patta land	‡ 123·60
1932	Spread from patta land	**6**

* 'Fire year' coincides with calendar year.

‡ Whole reserve.

† Severe widespread fire: young natural *Hopea* destroyed.

Statement of fires in Mannarghat Range.

Year.	Cause of fire.	Area burnt in acres.
	(*a*) SILENT VALLEY RESERVE.	
1925	Accident	**100**
1926	Spread from private forest	3
	By hillmen	20
	Total	**23**
1927	Accident while burning fire line.	20
	By minor forest produce contractor	120
	Total	**140**
1928	While fire tracing	**7**
1929	While burning fire line	50
	While collecting minor forest produce	100
	While burning rubbish	50
	Total	**200**
1930	While burning fire line	§ 25
1931	Not known	500
	Do.	150
	Total	**650**

Note.—Almost all these fires were in the grass land enclosed by the shola

§ Shola forest burnt in patches.

(b) ATTAPADI BLOCKS I TO V.

Year.	Cause of fire.	Area burnt in acres.
1913–14	While burning fire line	20
	Do.	4
	Spread from patta land	10
	Total	**34**
1914–15	Spread from patta land	100
	By villagers	20
	Total	**120**
1915–16	While fire tracing	500
	Not known	200
	Caused by forest guards while fire tracing	1,500
	By villagers	1,500
	Total	**3,700**
1916–17	Not known	1½
1917–18	Not known	4
	Do.	4½
	Total	**8½**
1918–19	By hillmen	**100**
1919–20	By hillmen while collecting minor forest produce	18
	Not known	36
	Total	**54**
1920–22	Nil.	
1923	Spread from cultivated land	5
	Negligence of coolies when cooking food	1
	Total	**6**
1924	From patta land	10
	Carelessness in fire tracing	20
	Negligence of coolies when cooking food	150
	Total	**180**
1926	Not known	**25**
1927	By minor forest produce contractor	50
	Accidental	20
	Total	**70**
1929	From patta land	200
1931	Not known	120
	Do.	300
	Do.	160
	Total	**580**

(c) PANAKADAN RESERVE.

Year.	Cause of fire.	Area burnt in acres.
1922	Mappilla rebels	*1,086
1923	Not known	½
1925	Accidental	30
1926	From patta land	25
1927	By wayfarer	1
	From the adjacent forest	2½
	Total	**3½**
1928	Spread from patta land	**25**
1929	From patta land	**200**
1932	From adjacent forest	125
	Do.	100
	Do.	2
	Total	**227**

† (d) KOTTANIKUNNU RESERVE.

Year.	Cause of fire.	Area burnt in acres.
1931	Not known	**5**
1932	Not known	1½
	By hill tribes	10
	Do.	15
	Do.	15
	Total	**41½**

STATEMENT OF FIRES IN BOLAMPATTI RANGE (AREA INCLUDED IN WORKING PLAN).

(a) BOLAMPATTY BLOCK II.

(Shola area.)

Year.	Cause of fire.	Area burnt in acres.
1924	Fire caused from janmi forest.	**30**
1928	Cause not known	**15**
1930	Offenders not known—graziers suspected	350
	Cause not known	40
	Total	**390**

(b) ATTAPADI BLOCK VI.

Year.	Cause of fire.	Area burnt in acres.
1914–15	By water-works people	32
	Not known	64
	Total	**‡96**
1917–18	By hill men	10
1927	By water-works people	60

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* The whole reserve was burnt.

† This reserve is not under special fire protection.

‡ This block is not under special fire protection and nothing is charged against protecting it from fire. But the fire-tracin t he western boundary of Bolampatti Block II, really helps to keep fires out of the grass round Muthikulam.

SECTION 5.—ADMINISTRATION.

382. In 1872, the Chenat Nair escheat forests were included in a newly constituted Palghat Range and placed under the Forest Superintendent, Anamalais. They were then transferred to the Tahsildar, Palghat, in 1873. In 1882–83, the range came under the District Forest Officer, Wynaad, with headquarters at Calicut. In 1886–87, the forest charges in Malabar were rearranged as North and South Malabar, and Palghat Range was included in the latter, with headquarters at Nilambur.

383. In 1905–06 the Palghat Range was transferred to South Coimbatore division and the Mannarghat Range was formed.

384. In 1910, the 'Attapadi' Range was formed, consisting of the Chenat Nair and surrounding reserves, and Attapadi Blocks I to VI; it was placed under the District Forest Officer, Central Coimbatore, when the forest charges in the Coimbatore district were divided into three in that year.

385. The Silent Valley, Panakadan and Attapadi Blocks I to VI were in South Malabar till 1910, the Silent Valley and Panakadan continuing in South Malabar, in the Mannarghat Range, till 1921.

386. Attapadi Block VI was transferred from Attapadi Range to Bolampatty Range on 1st April 1918, in which range it has continued up to date.

387. On the constitution of the Palghat Forest division in 1921, Attapadi Blocks I to V were retransferred to the Mannarghat Range, in the Palghat division. Attapadi Block VI remained with the Bolampatty Range. The Chenat Nair and surrounding reserves (together with Walayar) were placed together in one range, under the old name of "Palghat Range."

388. The following is a list of District Forest Officers who have held charge :—

Name of officer.	Term of office.
Captain Gosling	1867. (*a*)
Mr. Douglas	1872. (*a*)
,, Knox	1874. (*a*)
,, R. W. Morgan	1882–86. (*b*)
,, Gordon Hadfield	1887–95. (*c*)
About twenty officers	1896–1904. (*c*)
Mr. P. M. Lushington	1904–06. (*c*)
Several officers	1906–09. (*d*)
Mr. P. M. Lushington	April 1909 to 26th October 1909. (*d*)
,, C. E. C. Fischer	26th October 1909 to 2nd August 1911. (*e*)
,, M. Panchapakesa Ayyar.	2nd to 30th August 1911. (*e*)
,, B. F. Rigold	30th August to 2nd September 1911. (*e*)
,, M. Panchapakesa Ayyar.	2nd September 1911 to 20th June 1914.
,, C. E. C. Fischer	20th June 1914 to 22nd January 1915. (*e*)
,, K. A. Chengappa	22nd January to 12th June 1915. (*e*)
,, C. M. Hodgson	12th June 1915 to 10th September 1915 (*e*)
,, A. M. C. Littlewood	10th September 1915 to 16th April 1919. (*e*)
,, E. V. Padmanabha Pillai.	16th April 1919 to 10th May 1921. (*e*)
,, P. Govinda Menon	10th May to 17th July 1921. (*f*)
,, R. B. Cornwell	17th July 1921 to 19th August 1922.
Mr. F. D. Ardagh	19th August 1922 to 9th June 1923.
,, J. D. Conolly	9th June to 18th October 1923.
,, J. W. K. Wernham	18th October to 19th November 1923.
,, J. D. Conolly	19th November 1923 to 30th June 1924.
,, J. M. Sweet	30th June to 14th July 1924.
,, Saiduddin Ahmed	14th July to 15th December 1924.
,, D. F. Stileman	15th December 1924 to 23rd January 1925.
,, M. S. Rangaswami	23rd January to 6th February 1925.
,, H. R. M. Law	6th February to 1st June 1925.
,, H. E. Brown	1st June to 5th August 1925.
,, E. V. Padmanabha Pillai.	5th August 1925 to 30th November 1928.
,, S. Riazuddin	30th November 1928 to 3rd January 1929.
,, E. V. Padmanabha Pillai.	3rd January to 24th July 1929.
,, E. B. Ramachandra Rao.	24th July to 16th December 1929.
,, D. M. Currie	16th December 1929 to 7th October 1930.
Muhammad Habibullah Sahib.	8th October 1930 to date.

(*a*) Anamalai division. (*b*) Wynad division. (*c*) South Malabar division.
(*d*) South Coimbatore division and South Malabar (Mannarghat Range). (*e*) Central Coimbatore division from 1910.
(*f*) Palghat division formed in July 1921.

SECTION 6.—PAST YIELD.

389. The following statements exhibit the past yields from the various reserves in the area covered by the working plan; two separate statements are given for the Chenat Nair Reserve, one showing the yield exclusive of that obtained by timber felling by the Exploitation division, while the other shows the yield obtained by the latter division, in detail. From 1928 onwards, after the commencement of "Selection fellings," gross and net yields have been given: the gross yield is the volume of utilizable logs obtained from fellings and the net yield is the sawn outturn (sleepers, kolmarams, etc)., from such logs.

Statement showing past yield in cubic feet from the Chenat Nair Reserved Forest (excluding Exploitation division).

Species.	1881–83.	1895–96.	1896–97.	1897–98.	1898–99.	1899–00.	1900–01.	1901–02.	1902–03.	1903–04.
Dalbergia latifolia	..	25	28	45	696	..	..	296	1,060	..
Lagerstroemia lanceolata	..	8,631	7,400	8,972	4,426	9,303	..	4,486	521	..
Xylia xylocarpa	..	353	1,116	1,110	4,600	..	3,654	41	11	..
Pterocarpus marsupium	..	364	142	21	379	..	..	444	..	..
Dysoxylum sp.	..	6,035	7,084	2,141	..	..	..	6,420	8,633	3,278
Bischofia javanica	..	..	..	..	..	..	1,904	..	..	..
Albizzia sp.	..	101	1,780	801	34	383	..	..	..	..
Hopea sp.	..	898	1,259	1,310	2,482	..	24,873	1,179	1,300	92
Calophyllum sp.	..	13	1,580	..	..	..	..	..	2,883	388
Dillenia pentagyna	..	3,331	3,192	33	..	..	..	..	..	..
Anogeisses latifolia	..	1,859	..	..	..	..	..	..	..	..
Stereospermum xylocarpum	..	110	58	..	..	..	..	..	..	..
Terminalia paniculata	..	701	936	..	..	1,232	3,380	4,434	5,072	..
Artocarpus hirsuta	..	..	90	1,370	625	397	..	..	..	..
Grewia sp.	..	..	114	..	..	..	..	2,877	109	..
Strombosia ceylanica	..	..	398	6,432	2,937	284	3,195	..	..	..
Cedrela toona	..	..	446	..	..	152	..	93	..	..
Acrocarpus fraxinifolius	..	..	..	5,346	2,037	374	2,070	..	..	..
Terminalia tomentosa	..	..	..	62	48	..	..	..	..	..
Eugenia sp.	..	..	..	..	2	..	34	..	..	..
Adina cordifolia	..	..	..	..	..	1,152	..	..	..	..
Cinnamomum sp.	..	..	..	..	..	..	..	..	11	..
Canarium strictum	..	..	..	..	..	..	..	..	11	..
Spondias mangifera	..	..	..	..	..	..	..	..	11	..
Tectona grandis	..	..	..	..	..	..	..	..	33	..
Tetrameles nudiflora	..	..	..	..	..	..	2,070	..	..	..
Miscellaneous timber	..	1,875	3,393	584	..	3,523	..	997	1,296	721
Miscellaneous timber from selection fellings	11,375	..	28,000	25,502	..	..	..	..	..	..
Firewood	..	2,076	27,430	24,213	14,595	23,639	2,636	44,542	68,779	46,569
Palaquium ellipticum	..	..	..	..	..	..	..	..	..	..
Mesua ferrea	..	..	..	..	..	..	..	..	..	..
Artocarpus integrifolia	..	..	..	..	..	..	..	..	..	..

Species.	1904–05.	1905–06.	1906–07.	1907–08.	1908–09.	1909–10.	1910–11.	1911–12.	1912–13.	1913–14.
Dalbergia latifolia	..	..	..	..	..	..	..	..	..	..
Lagerstroemia lanceolata	..	..	..	..	..	..	..	..	..	..
Xylia xylocarpa	1,545	..	..	..	..	..	..	..	..	..
Pterocarpus marsupium	..	..	..	..	..	..	..	..	..	..
Dysoxylum sp.	..	..	..	..	..	..	..	..	..	..
Bischofia javanica	..	..	..	..	..	..	..	..	..	..
Albizzia sp.	..	..	..	..	..	..	..	..	..	..
Hopea sp.	..	..	..	..	..	..	..	..	..	..
Calophyllum sp.	..	..	..	..	..	..	..	..	..	..
Dillenia pentagyna	..	..	..	..	..	..	..	..	..	..
Anogeisses latifolia	..	..	..	..	..	..	..	..	..	..
Stereospermum Xylocarpa	..	..	..	..	..	..	..	..	..	..
Terminalia paniculata	..	..	..	..	..	..	..	..	..	..
Artocarpus hirsuta	..	..	..	..	..	..	..	..	..	..
Grewia sp.	..	..	..	..	..	..	..	..	..	..
Strombosia ceylanica	..	..	..	..	..	..	..	..	..	..
Cedrela toona	..	..	..	..	..	..	..	..	..	..
Acrocarpus fraxinifolius	..	..	..	..	..	..	..	..	..	..
Terminalia tomentosa	..	..	..	..	..	..	..	..	..	..
Eugenia sp.	..	..	..	..	..	..	..	..	..	..
Adina cordifolia	..	..	..	..	..	..	..	..	..	..
Cinnamomum sp.	..	..	..	..	..	..	..	..	..	..
Canarium strictum	..	..	..	..	..	..	..	..	..	..
Spondias mangifera	..	..	..	..	..	..	..	..	..	..
Tectona grandis	..	..	..	..	..	..	..	..	..	..
Tetrameles nudiflora	..	..	..	..	..	..	..	..	..	..
Miscellaneous timber	..	..	1,161	15,784	6,047	4,128	8,159	1,207	1,908	..
Miscellaneous timber from selection fellings	..	..	..	..	..	..	..	..	..	..
Firewood	1,32,108	40,000	..	14,240	42,320	40	4,408	2,26,800	1,60,320	..
Palaquium ellipticum	..	..	..	..	..	..	..	..	..	..
Mesua ferrea	..	..	..	..	..	..	..	..	..	..
Artocarpus integrifolia	..	..	..	..	..	..	..	..	..	..

Species.	1914–15.	1915–16.	1916–17.	1917–18.	1918–19.	1919–20.	1920–21.	1921–22.	1922–23.	1923–24.
Dalbergia latifolia	..	..	..	..	..	..	..	..	..	..
Lagerstroemia lanceolata	..	..	..	..	..	..	..	..	..	..
Xylia xylocarpa	..	..	..	..	..	..	..	..	..	..
Pterocarpus marsupium	..	..	..	..	..	..	..	..	..	..
Dysoxylum sp.	..	..	..	..	..	..	..	..	..	..
Bischofia javanica	..	..	..	..	..	..	..	..	..	..
Albizzia sp.	..	..	..	..	..	..	..	..	..	..
Hopea sp.	..	..	..	..	..	..	..	..	..	..
Calophyllum sp.	..	..	..	..	..	..	..	..	..	..
Dillenia pentagyna	..	..	..	..	..	..	..	..	..	..
Anogeisses latifolia	..	..	..	..	..	..	..	..	..	..
Stereospermum xylocarpa	..	..	..	..	..	..	..	..	..	..
Terminalia paniculata	..	..	..	..	..	..	..	..	..	..
Artocarpus hirsuta	..	..	..	..	..	..	..	..	..	..
Grewia sp.	..	..	..	..	..	..	..	..	..	..
Strombosia ceylanica	..	..	..	..	..	..	..	..	..	..
Cedrela toona	..	..	..	..	..	..	..	..	..	..
Acrocarpus fraxinifolius	..	..	..	..	..	..	..	..	..	..
Terminalia tomentosa	..	..	..	..	..	..	..	..	..	..
Eugenia sp.	..	..	..	..	..	..	..	..	..	..
Adina cordifolia	..	..	..	..	..	..	..	..	..	..
Cinnamomum sp.	..	..	..	..	..	..	..	..	..	..
Canarium strictum	..	..	..	..	..	..	..	..	..	..
Spondias mangifera	..	..	..	..	..	..	..	..	..	..
Tectona grandis	..	..	..	..	..	..	..	..	..	..
Tetrameles nudiflora	..	..	..	..	..	..	..	..	..	..
Miscellaneous timber	..	14,366	988	20,576	67,063	32,954	Exploitation.		69	182
Miscellaneous timber from selection fellings	..	..	..	..	..	..	..	..	..	..
Firewood	..	81,000	10,500	2,81,430	4,77,473	1,74,692	..	..	..	..
Palaquium ellipticum	..	..	..	..	..	..	..	..	..	..
Mesua ferrea	..	..	..	..	..	..	..	..	..	..
Artocarpus integrifolia	..	..	..	..	..	..	..	..	..	..

Statement showing past yield in cubic feet from the Chenat Nair Reserved Forest (excluding Exploitation division)—cont.

Species.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.		1931–32.	
							537	380	300	157
Dalbergia latifolia	..	..	..	..	..	..	355	273	..	..
Lagerstroemia lanceolata	..	..	..	..	..	..	10,133	4,107	..	..
Xylia xylocarpa	..	..	..	..	..	..	..	..	..	..
Pterocarpus marsupium	..	..	..	..	..	..	1,763	1,451	..	..
Dysoxylum sp.	..	..	..	..	..	..	..	..	..	..
Bischofia javanica	..	..	..	..	..	..	..	..	..	..
Albizzia sp.	..	..	..	..	..	..	..	..	..	..
Hopea sp.	..	..	..	..	..	..	..	..	..	..
Calophyllum sp.	..	..	..	..	..	..	13,239	6,678	..	..
Dillenia pentagyna	..	..	..	..	..	..	..	..	..	..
Anogeisses latifolia	..	..	..	..	..	..	..	..	..	..
Stereospermum xylocarpa	..	..	..	..	..	..	..	..	..	..
Terminalia paniculata	..	..	..	..	..	..	..	..	..	..
Artocarpus hirsuta	..	..	..	..	..	..	4,881	3,689	..	..
Grewia sp.	..	..	..	..	..	..	3,478	2,046	31	17
Strombosia ceylanica	..	..	..	..	..	..	2,846	..	..	..
Cedrela toona	..	..	..	..	..	..	..	..	..	..
Aerocarpus fraxinifolius	..	..	..	..	..	..	..	..	..	..
Terminalia tomentosa	..	..	..	..	..	..	..	..	..	..
Eugenia sp.	..	..	..	..	..	..	..	..	..	..
Adina cordifolia	..	..	..	..	..	..	..	..	..	..
Cinnamomum sp.	..	..	..	..	..	..	..	..	..	..
Canarium strictum	..	..	..	..	..	..	..	..	..	..
Spondias mangifera	..	..	..	..	..	..	..	..	..	..
Tectona grandis	..	..	..	..	..	..	..	..	..	..
Tetrameles nudiflora	..	..	..	..	..	..	..	..	..	..
Miscellaneous timber	16	..	1,222	288	..	576	..	..	..	..
Miscellaneous timber from selection fellings	17	..	14	764	..	..	..	..	..	..
Firewood	..	..	..	..	..	..	76,629	40,052	30	17
Palaquium ellipticum	..	..	..	..	..	..	44,339	21,067	37,874	16,944
Mesua ferrea	..	..	..	..	..	..	204	110	..	..
Artocarpus integrifolia	..	..	..	..	..	..	..	..	..	..

Statement showing past yield in cubic feet from the Dhoni, Thampurattipottai and Puliampalli Tope Reserves.

Species.	1881–83.	1895–96.	1899–00.	1901–02.	1902–03.	1903–04.	1904–05.	1910–11.	1911–12.	1912–13.
					DHONI RESERVE.					
Timber	..	25	..	..	..	..	123	45	..	..
Firewood	..	..	..	..	49,946	17,915	..	..	240	..
Poles—Miscellaneous	..	..	..	..	..	..	..	464	..	..
					THAMPURATTIPOTTAI RESERVE.					
Timber	..	..	..	..	..	..	5	..	..	..
Firewood	..	60,307	64	..	..	69,200	4	..	..	17,720
					PULIAMPALLI TOPE RESERVE.					
Timber	..	..	..	37	..	..	200	24	..	..
Firewood	..	..	..	..	..	..	..	..	160	..
Poles—Miscellaneous	..	..	..	..	..	..	..	..	..	..

Species	1913–14.	1914–15.	1916–17.	1917–18.	1918–19.	1919–20.	1920–21.	1922–23.	1923–24.	1924–25
					DHONI RESERVE.					
Timber	..	..	2,929	13	..	1,028	1,079	11	127	20
Firewood	..	..	93,270	2,830	3,200	5,560	840	..	..	..
Poles—Miscellaneous	..	..	6,360	..	..	..	..	..	..	..
					THAMPURATTIPOTTAI RESERVE.					
Timber	1,148	3,000	..	..	308	20	11	..	..	19
Firewood	48,280	1,08,800	..	..	2,150	650	..	..	..	..
					PULIAMPALLI TOPE RESERVE.					
Timber	..	..	..	..	2,997	37	..	..	..	..
Firewood	..	..	..	..	53,180	..	..	..	..	..
Poles—Miscellaneous	..	..	..	..	..	..	..	..	..	..

Species.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.		1931–32.		Remarks
						GROSS.	NET.	GROSS.	NET.	
					DHONI RESERVE.					
Timber	..	1,169	..	157	..	841	..	141	..	There was no yield in the years not shown here.
Firewood	9,853	19,000	..	3,835	..	..	..	80	..	
Poles—Miscellaneous	..	..	..	..	2,052	1,256	..	..	..	
					THAMPURATTIPOTTAI RESERVE.					
Timber	..	17	..	15	..	..	..	..	..	
Firewood	..	..	..	..	..	..	..	..	..	
					PULIAMPALLI TOPE RESERVE.					
Timber	..	1,169	..	..	..	..	..	..	..	
Firewood	..	19,000	40	..	..	..	..	..	..	..
Poles—Miscellaneous	..	..	..	..	..	6,020	..	..	..	..

Statement showing the past yield, in cubic feet from the Chenat Nair Reserved Forest (Exploitation division).

	Species.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28	1928–29.	1929–30.
1	*Tectona grandis*	..	..	..	..	..	..	..	2,493	66	570
2	*Acrocarpus fraxinifolius*	..	..	1,123	..	..	4,072	4,176	3,404	1,568	82
3	*Dysoxylum malabaricum*	951	1,305	830	885	1,169	762	407	..	..	..
4	*Terminalia tomentosa*	440	530	1,342	..	..	52	..	2,132	647	4,267
5	*Terminalia paniculata*	1,186	2,025	13,278	..	5,837	2,953	6,163	8,387	9,314	15,048
6	*Lagerstroemia lanceolata*	656	923	3,633	..	4,807	5,464	7,405	8,879	8,489	9,641
7	*Xylia xylocarpa*	803	1,199	14,992	..	8,669	923	6,854	8,491	54	73,450
8	*Artocarpus integrifolia*	100	103	..	..	..	..	..	..	172	14
9	*Pterocarpus marsupium*	..	40	674	..	..	..	..	175	528	1,255
10	*Artocarpus hirsuta*	..	..	422	..	..	1,256	..	311	274	313
11	*Mesua ferrea*	1,341	2,840	3,056	10,778	1,032	4,401	4,393	..	..	23,229
12	*Cedrela toona*	..	..	..	..	..	..	..	367	238	86
13	*Grewia tiliaefolia*	1,303	1,844	9,690	..	..	769	3,170	..	..	..
14	*Calophyllum elatum*	2,293	3,521	2,392	7,341	3,977	46,860	11,687	45,594	28,167	6,325
15	*Palaquium ellipticum*	10,055	18,834	..	17,987	5,281	11,242	17,753	245	5,449	20,691
16	*Stereospermum xylocarpum*	7	38	..	..	..	..	..	1,058	193	219
17	*Albizzia odoratissima*	121	264	1,332	..	..	251	..	3,386	5,159	5,674
18	*Homalium zeylanicum*	..	..	..	861	3,552	6,204	1,642	1,229	1,865	1,607
19	*Diospyros insignis*	1,689	2,662	2,452	2,636	1,205	3,968	..	1,066	1,183	486
20	*Eugenia sp.*	426	564	1,772	..	..	..	..	..	..	..
21	*Cullenia excelsa*	19,251	28,061	2,874	29,613	22,409	..	9,816	..	520	149
22	*Albizzia procera*	284	449	..	..	..	..	..	87	109	592
23	*Bombax malabaricum*	..	..	..	..	..	..	..	4,386	4,439	6,420
24	*Elaeocarpus tuberculatus*	..	..	464	2,156	1,103	5,040	..	1,086	600	527
25	*Trewia nudiflora*	..	30	6	..	..	..	..	921	71	89
26	*Polyalthia fragrans*	..	..	..	..	..	..	..	5,070	921	24
27	*Alstonia scholaris*	..	..	36	..	..	..	..	2,505	767	190
28	*Machilus macrantha*	600	1,216	1,067	3,390	1,232	6,970	4,178	7,973	6,707	4,848
29	*Holigarna arnottiana*	2,038	2,893	6	3,034	3,168	10,868	..	4,295	3,257	1,647
30	*Canarium strictum*	344	469	151	..	..	..	..	280	1,168	530
31	*Strombosia ceylanicum*	3,016	3,873	3,054	..	..	..	..	1,640	1,142	156
32	*Mangifera indica*	199	336	32	..	..	..	..	1,454	1,372	134
33	*Sterculia alata*	..	..	..	..	..	..	..	285	181	..
34	*Garcinia indica*	130	268	..	..	..	..	..	152	259	..
35	*Lansium unamulayanum*	..	..	..	..	..	..	..	..	..	..
36	*Bischofia javanica*	..	..	257	274	594	4,234	2,360	334	..	..
37	*Terminalia belerica*	202	216	..	..	..	..	..	4,061	4,543	1,952
38	*Amoora canarana*	..	..	..	..	..	..	..	..	..	..
39	*Adina cordifolia*	25	..	..	..	..	..	..	92	..	90
40	*Myristica attenuata*	515	875	851	..	..	3,770	2,188	392	1,367	555
41	*Dalbergia latifolia*	8	56	..	..	..	420	1,635	1,499	1,552	45
42	*Cinnamomum zeylanicum*	132	191	113	..	..	..	..	100	147	444
43	*Hopea parviflora*	..	..	616	..	973	569	2,007	..	..	..
44	*Pterospermum rubiginosum*	..	..	..	..	..	..	..	159	264	..
45	*Vitex altissima*	..	..	..	..	..	..	..	99	..	..
46	*Saccopetalum tomentosum*	945	1,477	5,762	222	..	..	..	336	110	551
47	*Anogeissus latifolia*	340	402	..	..	..	..	..	..	30	..
48	*Dillenia pentagyna*	234	493	142	..	..	..	..	..	..	..
49	*Odina wodier*	587	748	..	..	..	..	..	..	..	..
50	*Hemicyclia elata*	1,014	3,641	3,138	3,226	..	..	..	..	..	642
51	*Wrightia tinctoria*	..	23	..	..	..	..	..	..	..	..
52	*Garcinia morella*	..	21	..	..	..	..	..	..	..	..
53	*Bombax insigne*	..	71	..	..	..	..	..	..	..	..
54	*Nauclea purpurea*	..	..	..	741	73	321	175	107	37	..
55	*Lagerstroemia macrocarpa*	..	..	..	..	..	..	863	111	592	489
56	*Lagerstroemia flos-reginae*	..	..	..	..	..	..	..	257	..	..
57	Total of all species	**51,235**	**82,501**	**75,557**	**83,144**	**65,082**	**1,21,369**	**86,872**	**1,24,898**	**93,521**	**1,83,031**
58	Miscellaneous	1,02,091	24,750	..	9,894	49,024	90,581	81,158	1,09,420	1,49,369	34,077
59	Grand total	**1,53,326**	**1,07,251**	**75,557**	**93,038**	**1,14,106**	**2,11,950**	**1,68,030**	**2,34,318**	**2,42,890**	**2,17,108**
60	Firewood	16,680	21,942	..	..	..	1,28,860	10,911	..	..	..
61	Sleepers from *Mesua ferrea*, *Xylia xylocarpa, etc.* species. Net volume.	..	..	..	..	..	..	11,822	42,025	56,104	..

Statement showing the past yield in cubic feet from the Silent Valley Reserve.

Name of species.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mesua ferrea	..	..	..	..	..	..	..
Palaquium ellipticum.	..	..	..	26	15	..	38
Timber (Pali and poon together)	92	174	1,886	..	..	..	..
Calophyllum elatum	..	..	..	42	10	..	..
Hopea sp.	..	..	..	..	..	..	..
Acrocarpus fraxinifolius.	..	..	..	..	..	..	..
Artocarpus integrifolia.	..	..	..	..	..	..	..
Miscellaneous	..	..	..	..	..	437	71

	1928–29.		1929–30.		1930–31.		1931–32.	
	Gross.	Net.	Gross.	Net.	Gross.	Net.	Gross.	Net.
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Mesua ferrea	67,900	27,969	68,159	36,585	94,120	46,375	50,518	22,638
Palaquium ellipticum.	37,843	17,127	16,279	8,145	457	..	..	..
Timber (Pali and poon together).	..	..	..	..	..	..	..	..
Calophyllum elatum.	10,885	5,227	4,483	2,189	..	..	..	..
Hopea sp.	188	73	45	25	..	..	..	..
Acrocarpus fraxinifolius.	647	338	70	..	..	..	..	..
Artocarpus integrifolia.	174	..	..	..	..	..	..	..
Miscellaneous	126	..	957	..	..	..	..	..

Statement showing the past yield in cubic feet from the Panakadan Reserve.

Name of species. (1)	1921–22 (2)	1922–23 (3)	1923–24 (4)	1924–25 (5)	1925–26 (6)	1926–27 (7)	1927–28 (8)
Fuel	..	150	80	..	..	..	40
Artocarpus hirsuta	..	..	..	..	..	..	27
Xylia xylocarpa	..	..	..	..	..	..	22
Albizzia sp.	..	..	..	..	..	..	..
Miscellaneous timber.	1,092	474	5,913	2,888	..	..	..

	1928–29		1929–30		1930–31		1931–32	
	Gross (9)	Net (10)	Gross (11)	Net (12)	Gross (13)	Net (14)	Gross (15)	Net (16)
Fuel	..	..	..	..	..	..	..	..
Artocarpus hirsuta	..	..	..	..	..	..	..	..
Xylia xylocarpa	..	..	..	..	..	..	..	..
Albizzia sp.	..	91	..	..	..	..	..	..
Miscellaneous timber	..	34	..	..	..	..	..	..

Statement showing the past yield in cubic feet from the Attapadi Blocks I to VI Reserves.

Species. (1)	1909–10 (2)	1910–11 (3)	1911–12 (4)	1912–13 (5)	1913–14 (6)	1914–15 (7)	1915–16 (8)	1916–17 (9)	1917–18 (10)
Timber	13,072	..	794	..	343	..	351	57	..
Species.	1918–19 (11)	1919–20 (12)	1920–21 (13)	1921–22 (14)	1922–23 (15)	1923–24 (16)	1924–25 (17)	1925–26 (18)	1926–27 (19)
Timber	..	..	..	877	307	..	954	4,783	1,345

SECTION 7.—PAST REVENUE AND EXPENDITURE.

390. The figures for revenue and expenditure for the Chenat Nair Reserve before 1876 have been gathered from administration reports, and are very meagre. From 1876 to 1903, the figures have been copied from the reserve book, which does not give the expenditure on establishment. From 1903 to 1910 no figures are available. From 1910 onwards the proportion of the establishment charges to be debited against the area covered by the working plan has been furnished by the District Forest Officer, Palghat. The revenue and expenditure of the Chenat Nair Exploitation division, between 1920 and 1930, have been incorporated. All values have been rounded off to whole rupees.

Statement of past Revenue and Expenditure.

		Revenue.										
Year. (1)	Name of reserve. (2)	Timber by Government. (3) RS.	Fuel by Government. (4) RS.	Bamboos by Government. (5) RS.	Timber by contractor. (6) RS.	Fuel by contractor. (7) RS.	Bamboos by contractor. (8) RS.	Grazing and grass. (9) RS.	Minor forest produce. (10) RS.	Confiscated produce. (11) RS.	Miscellaneous. (12) RS.	Total Revenue. (13) RS.
1864–65	Chenat Nair	1,310	..	..	..	..	..	..	..	..	..	1,310
1867–68	Do.	1,499	..	..	..	..	..	..	..	..	..	1,499
1876–77	Do.	807	..	..	728	2,117	437	..	80	..	..	4,169
1877–78	Do.	1,977	..	48	461	786	197	..	200	2	..	3,671
1878–79	Do.	3,119	..	15	..	980	..	..	..	..	120	4,234
1880–81	Do.	2,595	..	18	..	..	..	..	..	..	6	2,619
1881–82	Do.	3,089	44	..	..	423	..	..	100	..	..	3,656
1882–83	Do.	3,649	..	..	280	954	..	..	250	..	1	5,134
1883–84	Do.	1,940	1,000	..	..	..	..	..	165	..	15	3,120
1884–85	Do.	247	59	..	..	..	..	..	17	..	..	323
1885–86	Do.	2,943	..	..	..	221	..	..	117	..	..	3,281
1886–87	Do.	4,258	..	..	78	156	6	102	84	6	..	4,690
1887–88	Do.	4,816	..	..	..	4	22	..	354	80	..	5,276
1888–89	Do.	4,274	..	..	53	309	90	75	39	281	10	5,131
1889–90	Do.	4,355	..	..	50	378	19	90	384	1	10	5,287
1890–91	Do.	3,000	..	..	300	150	11	101	56	12	5	3,635
1891–92	Do.	..	..	..	163	222	17	113	538	1	..	1,054
1892–93	Do.	4,513	..	..	59	562	35	93	348	1	..	5,611
1893–94	Do.	4,509	..	..	56	347	212	51	716	2	..	5,893
1894–95	Do.	4,996	..	..	1,076	326	37	157	564	1	..	7,157
1895–96	Do.	10,554	..	..	2,336	293	27	..	1,075	..	5	14,290
1896–97	Do.	5,089	..	..	2,965	359	22	124	685	3	22	9,269
1897–98	Do.	5,363	..	..	1,699	310	43	..	876	..	9	8,300
1898–99	Do.	4,238	..	..	833	145	21	82	655	..	5	5,979
1899–00	Do.	5,077	..	..	506	201	2	56	755	..	14	6,611
	Puliampalli	..	..	..	..	..	..	..	5	..	..	5
1900–01	Chenat Nair	911	119	..	2,282	41	..	57	536	..	22	3,968
1901–02	Do.	152	..	..	3,835	443	16	46	680	4	20	5,196
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	5	..	..	5
	Thampurattipottai		..	..	..	..	..	..	..	..	..	..
	Total	**152**	..	..	**3,835**	**443**	**16**	**46**	**685**	**4**	**20**	**5,201**

Statement of past Revenue and Expenditure—cont.

Revenue.

Year. (1)	Name of reserve. (2)	Timber by Government. (3) RS.	Fuel by Government. (4) RS.	Bamboos by Government. (5) RS.	Timber by contractor. (6) RS.	Fuel by contractor. (7) RS.	Bamboos by contractor. (8) RS.	Grazing and grass. (9) RS.	Minor forest produce. (10) RS.	Confiscated produce. (11) RS.	Miscellaneous. (12) RS.	Total Revenue. (13) RS.
1902–03	Chenat Nair	2	..	..	4,359	666	29	..	493	..	5	5,554
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	3,055	..	..	..	..	..	3,055
	Total	**2**	..	..	**4,359**	**3,721**	**29**	..	**493**	..	**5**	**8,609**
1903–04	Chenat Nair	No information up to 1909–10.										
	Dhoni											
	Puliampalli											
	Thampurattipottai											
1904–05	Chenat Nair											
1905–06	Do.											
1906–07	Do.											
1907–08	Do.											
1908–09	Do.											
1909–10	....	..	..	..	..	1,906	..	..	..	..	..	1,906
1910–11	Chenat Nair	..	..	..	..	5,375	..	..	..	..	..	5,375
	Dhoni	..	..	..	5	..	..	..	..	..	..	5
	Thampurattipottai	..	..	..	..	..	..	..	..	..	26	26
	Puliampalli	106	..	..	..	..	..	..	..	..	..	106
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	202	..	..	202
	Attapadi Block VI	..	..	..	..	..	..	..	163	..	..	163
	Total	**106**	..	..	**5**	**5,375**	..	..	**365**	..	**26**	**5,877**
1911–12	Chenat Nair	..	..	..	..	6,000	..	..	..	..	..	6,000
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	10	..	..	10
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V	..	..	..	..	..	..	..	202	..	..	202
	Attapadi Block VI	..	..	..	..	..	..	..	505	..	..	505
	Total	..	..	..	..	**6,000**	..	..	**717**	..	..	6,717
1912–13	Chenat Nair	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	5	..	..	1,800	..	..	..	..	..	1,805
	Puliampalli	41	2	..	..	..	..	..	..	..	..	43
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	202	..	..	202
	Attapadi Block VI	..	..	..	..	..	..	..	..	..	..	..
	Total	**41**	**7**	..	..	**1,800**	..	..	**202**	..	..	**2,050**
1913–14	Chenat Nair	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	25	..	..	25
	Thampurattipottai	..	..	..	..	3,500	..	..	..	..	..	3,500
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	254	..	..	254
	Attapadi Block VI	..	..	..	..	..	..	..	..	..	..	..
	Total	..	..	..	..	**3,500**	..	..	**279**	..	..	**3,779**
1914–15	Chenat Nair	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	2,870	..	..	..	..	..	2,870
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	254	..	..	254
	Attapadi Block VI	..	..	..	..	..	..	..	350	..	..	350
	Total	..	..	..	..	**2,870**	..	..	**604**	..	..	**3,474**
1915–16	Chenat Nair	..	..	..	..	3,375	..	..	..	..	..	3,375
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	254	..	..	254
	Attapadi Block VI	..	..	..	..	..	..	..	..	..	..	..
	Total	..	..	..	..	**3,375**	..	..	**254**	..	..	**3,629**
1916–17	Chenat Nair	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	854	..	..	..	..	..	854
	Puliampalli	..	..	..	..	..	..	..	17	..	..	17
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	135	..	..	135
	Attapadi Block VI	..	..	..	..	..	..	..	105	..	..	105
	Total	..	..	..	..	**854**	..	..	**257**	..	..	**1,111**
1917–18	Chenat Nair	..	..	..	..	6,750	..	..	..	..	..	6,750
	Dhoni	42	115	..	..	..	..	..	..	..	..	157
	Puliampalli	..	..	..	..	..	..	..	33	..	..	33
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	132	..	..	132
	Attapadi Block VI	..	..	..	..	..	..	..	100	..	..	100
	Panakadan	7	..	..	..	..	..	..	..	..	..	7
	Total	**49**	**115**	..	..	**6,750**	..	..	**265**	..	..	**7,179**
1918–19	Chenat Nair	..	..	..	..	13,296	..	..	..	..	..	13,296
	Dhoni	4	73	..	..	2,268	..	..	..	..	..	2,345
	Puliampalli	99	215	..	..	..	..	..	27	..	..	341
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	150	..	..	150
	Attapadi Block VI	..	..	..	..	..	..	..	117	..	..	117
	Silent valley	..	..	..	..	..	..	..	282	..	..	282
	Panakadan	..	..	..	..	..	..	..	400	..	..	400
	Total	**103**	**288**	..	..	**15,564**	..	..	**976**	..	..	**16,931**

Statement of past Revenue and Expenditure—cont.

		Revenue.										
Year. (1)	Name of reserve. (2)	Timber by Government (3) RS.	Fuel by Government. (4) RS.	Bamboos by Government. (5) RS.	Timber by contractor. (6) RS.	Fuel by contractor. (7) RS.	Bamboos by contractor. (8) RS.	Grazing and grass. (9) RS.	Minor forest produce. (10) RS.	Confiscated produce. (11) RS.	Miscellaneous. (12) RS.	Total Revenue. (13) RS.
1919–20	Chenat Nair	..	..	..	..	17,631	..	..	..	..	..	17,631
	Dhoni	60	65	..	..	6,114	..	..	..	..	..	6,239
	Puliampalli	10	..	..	..	434	..	..	..	..	..	444
	Thampurattipottai	..	..	..	..	486	..	..	..	..	..	486
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	150	..	..	150
	Attapadi Block VI	..	..	..	..	..	..	..	170	..	..	170
	Silent valley	..	..	..	..	..	..	..	233	..	..	233
	Panakadan	..	..	..	..	..	..	..	..	..	..	..
	Total	**70**	**65**	..	..	**24,665**	..	..	**553**	..	..	**25,353**
1920–21	Chenat Nair exploitation division.	..	..	..	..	..	..	..	..	..	..	..
	Chenat Nair district	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	7	22	..	..	..	..	..	..	..	..	29
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	2,205	..	..	..	..	..	2,205
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	150	..	..	150
	Attapadi Block VI	..	..	..	..	..	..	..	250	..	..	250
	Silent valley	..	..	..	..	..	..	..	241	..	..	241
	Panakadan	..	..	..	..	..	..	..	..	..	..	..
	Total	**7**	**22**	..	..	**2,205**	..	..	**641**	..	..	**2,875**
1921–22	Chenat Nair exploitation division.	1,743	719	..	..	574	..	..	325	..	2,954	6,315
	Chenat Nair district	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	70	..	..	70
	Attapadi Block VI	72	..	..	..	..	..	..	250	..	..	322
	Silent valley	..	..	..	..	..	..	..	152	..	..	152
	Panakadan					Mappilla rebellion.						
	Total	**1,815**	**719**	..	..	**574**	..	..	**797**	..	**2,954**	**6,859**
1922–23	Chenat Nair exploitation division.	3,591	..	..	..	1,522	..	..	..	..	647	5,760
	Chenat Nair district	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	70	..	..	70
	Attapadi Block VI	..	..	..	..	..	..	..	250	..	79	329
	Silent valley	..	..	..	..	..	..	..	160	..	..	160
	Panakadan	..	..	..	..	..	..	..	..	..	..	..
	Total	**3,591**	..	..	..	**1,552**	..	..	**480**	..	**726**	**6,319**
1923–24	Chenat Nair exploitation division.	35,480	..	..	..	3,785	..	..	..	..	5,566	44,831
	Chenat Nair district	46	..	..	..	931	..	..	1,071	30	255	2,333
	Dhoni	20	..	..	..	..	..	..	150	..	52	222
	Puliampalli	..	..	..	..	..	..	..	100	..	38	138
	Thampurattipottai	..	..	..	..	..	..	..	50	..	13	63
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	70	..	490	560
	Attapadi Block VI	..	..	..	..	..	..	..	214	..	4	218
	Silent valley	..	..	..	..	..	..	..	200	..	..	200
	Panakadan	..	..	..	..	..	..	..	20	..	..	20
	Total	**35,546**	..	..	..	**4,716**	..	..	**1,875**	**30**	**6,418**	**48,585**
1924–25	Chenat Nair exploitation division.	27,632	1,364	..	..	586	..	..	..	..	3,864	33,446
	Chenat Nair district	..	..	..	..	..	1,465	..	1,830	5	58	3,358
	Dhoni	15	..	..	..	..	..	..	..	..	9	24
	Puliampalli	..	..	..	..	..	..	..	..	..	28	28
	Thampurattipottai	1	..	..	..	..	..	..	..	..	5	6
	Attapadi Blocks I to V.	26	..	..	..	..	..	..	277	103	..	406
	Attapadi Block VI	..	..	..	..	..	..	..	140	..	..	140
	Silent valley	..	..	..	..	..	..	..	200	..	..	200
	Panakadan	..	..	..	..	..	..	..	20	..	27	47
	Total	**27,674**	**1,364**	..	..	**586**	**1,465**	..	**2,467**	**108**	**3,991**	**37,655**
1925–26	Chenat Nair exploitation division.	47,108	4,546	..	..	455	..	..	..	..	3,308	55,417
	Chenat Nair district	3	163	..	..	..	1,096	..	850	80	283	2,475
	Dhoni	..	..	..	..	..	..	..	..	..	5	5
	Puliampalli	..	..	..	..	..	..	..	..	..	11	11
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	4
	Attapadi Blocks I to V.	26	..	..	..	..	..	..	277	..	..	303
	Attapadi Block VI	..	..	..	..	..	..	..	200	..	..	200
	Silent valley	..	..	..	..	..	..	..	200	..	..	200
	Panakadan	..	..	..	..	..	..	..	20	..	3	23
	Total	**47,137**	**4,709**	..	..	**455**	**1,096**	..	**1,547**	**80**	**3,614**	**58,638**
1926–27	Chenat Nair exploitation division.	1,09,684	2,693	..	..	808	..	..	..	..	1,795	1,14,980
	Chenat Nair district	..	..	..	..	..	..	..	850	..	50	900
	Dhoni	..	452	..	..	..	..	..	..	..	..	452
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	277	..	..	277
	Silent Valley	..	..	..	..	..	..	..	400	..	..	400
	Panakadan	..	..	..	..	..	..	..	215	..	..	215
	Total	**1,09,684**	**3,145**	..	..	**808**	..	..	**1,742**	..	**1,845**	**,17,22**

Statement of past Revenue and Expenditure—cont.

Revenue.

Year. (1)	Name of reserve. (2)	Timber by Government. (3)	Fuel by Government. (4)	Bamboos by Government. (5)	Timber by contractor. (6)	Fuel by contractor. (7)	Bamboos by contractor. (8)	Grazing and grass. (9)	Minor forest produce. (10)	Confiscated produce. (11)	Miscellaneous. (12)	Total Revenue. (13)
		RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
927–28	Chenat Nair exploitation division.	1,94,730	910	..	..	4,769	5,566	..	..	..	732	2,06,707
	Chenat Nair district ..	..	..	..	..	..	..	..	1 131	..	45	1,176
	Dhoni	..	75	..	..	..	..	..	..	..	..	75
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	555	..	..	555
	Attapadi Block VI ..	..	..	..	..	..	..	..	500	..	..	500
	Silent Valley	..	..	..	..	..	..	..	217	..	..	217
	Panakadan	..	..	..	..	..	..	..	..	..	..	..
	Total ..	**1,94,730**	**985**	..	..	**4,769**	**5,566**	..	**2,403**	..	**777**	**2,09,230**
1928–29	Chenat Nair exploitation division.	2,47,898	4,877	..	..	..	5,625	..	..	..	834	2,59,234
	Chenat Nair district ..	..	..	..	..	..	..	..	625	..	15	640
	Dhoni	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	700	..	..	700
	Attapadi Block VI ..	..	..	..	..	..	..	..	..	..	..	..
	Silent Valley	9,987	..	..	..	..	..	..	325	..	..	10,312
	Panakadan	..	..	..	..	..	..	..	100	..	..	100
	Total ..	**2,57,885**	**4,877**	..	..	..	**5,625**	..	**1,750**	..	**849**	**2,70,986**
1929–30	Chenat Nair exploitation division.	2,04,690	3,677	..	..	..	3,000	..	..	..	368	2,11,735
	Chenat Nair district ..	..	..	..	..	..	..	4	774	..	..	778
	Dhoni	1	2,466	..	..	..	..	..	..	..	..	2,467
	Puliampalli	3	..	..	..	..	..	..	..	..	..	3
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	1,400	..	..	1,400
	Attapadi Block VI ..	..	..	..	..	..	..	..	900	..	..	900
	Silent Valley	87,802	..	318	..	..	..	..	1,125	..	..	89,245
	Panakadan	..	..	..	..	..	..	..	150	..	..	150
	Total ..	**2,92,496**	**6,143**	**318**	..	..	**3,000**	**4**	**4,349**	..	**368**	**3,06,678**
1930–31	Chenat Nair	68,990	..	3,100	..	..	..	..	441	..	..	72,531
	Dhoni	55	1,860	..	..	..	..	..	..	..	..	1,915
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	1,030	..	..	1,030
	Attapadi Block VI ..	..	..	..	..	..	..	..	1,000	..	..	1,000
	Silent Valley	1,08,444	..	..	..	..	..	..	625	..	..	1,09,069
	Panakadan	..	..	..	..	..	..	..	125	..	..	125
	Total ..	**1,77,489**	**1,860**	**3,100**	..	..	..	..	**3,221**	..	..	**1,85,670**
1931–32	Chenat Nair	54,188	553	800	..	..	..	..	830	..	..	56,371
	Dhoni	90	4,998	..	..	..	..	..	..	..	..	5,088
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V.	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Block VI ..	..	..	..	..	..	..	..	115	..	..	115
	Silent Valley	93,993	..	..	..	..	..	..	..	..	..	93,993
	Panakadan	..	..	..	..	..	..	..	..	..	37	37
	Total ..	**1,48,271**	**5,551**	**800**	..	..	..	..	**945**	..	**37**	**1,55,604**

Statement of past Revenue and Expenditure—cont.

Expenditure.

Year.	Name of Reserve.	Timber.	Fuel.	Bamboos.	Feed and up keep of animals.	Purchase of stores and repairs.	Repairs to roads and bridges.	Buildings and repairs.	Other works.	Demarcation.	Regeneration.	Fire protection.	Establishment.	Miscellaneous.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
		RS.	RS.	RS.		RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1864–65	Chenat Nair	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1867–68	Do.	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1871–72	Do.	..	..	..	..	..	..	..	..	..	663	..	..	..	663
1872–73	Do.	..	..	..	..	..	..	..	..	..	1,245	..	..	..	1,245
1876–77	Do.	371	..	..	..	..	137	..	132	..	..	19	..	..	659
1877–78	Do.	1,875	..	35	..	38	331	..	226	151	..	..	..	31	2,686
1878–79	Do.	1,862	..	9	..	..	..	..	..	..	..	..	..	1	1,872
1880–81	Do.	1,306	..	11	..	6	130	..	19	459	..	8	..	..	1,939
1881–82	Do.	1,992	..	24	..	..	39	..	..	..	..	47	..	..	2,102
1882–83	Do.	2,083	..	..	..	..	..	..	6	..	..	..	..	..	2,089
1883–84	Do.	849	..	..	..	6	53	115	1	1	..	13	..	11	1,049
1884–85	Do.	502	36	..	..	..	..	..	207	35	..	..	40	9	829
1885–86	Do.	1,273	..	..	..	..	..	655	..	28	..	161	..	40	2,157
1886–87	Do.	2,001	..	..	..	..	174	239	104	164	..	254	..	25	2,961
1887–88	Do.	2,014	..	..	..	24	58	215	..	2	..	380	..	..	2,693
1888–89	Do.	1,922	..	..	..	13	..	77	..	43	..	403	1	55	2,514
1889–90	Do.	2,033	..	8	..	4	..	87	..	112	..	381	..	17	2,642
1890–91	Do.	1,731	..	2	..	..	142	211	..	251	..	354	..	2	2,693
1891–92	Do.	2,297	..	2	..	..	715	81	2	34	..	384	..	..	3,515
1892–93	Do.	2,377	..	8	..	..	1	144	..	..	..	439	..	1	2,970
1893–94	Do.	2,568	..	..	..	..	323	69	..	..	..	446	..	12	3,418
1894–95	Do.	2,608	..	..	..	..	27	83	..	..	..	432	..	..	3,150
1895–96	Do.	2,897	..	..	..	..	77	448	..	..	..	451	..	..	3,873
1896–97	Do.	3,131	..	..	..	..	..	1,090	2	..	..	451	..	..	4,674
1897–98	Do.	2,996	..	..	..	..	313	378	..	..	..	456	..	..	4,143
1898–99	Do.	2,999	..	..	..	..	32	241	..	..	..	442	..	..	3,714
1899–00	Do.	3,376	..	..	..	..	130	..	..	..	..	452	..	..	3,958
Do.	Puliampalli	..	..	..	..	..	..	..	..	..	..	..	..	20	20
1900–01	Chenat Nair	19,110	..	..	..	..	5	..	..	..	..	420	..	25	19,560
Do.	Thampurattipottai	..	..	..	..	..	..	..	54	..	..	15	..	..	69
1901–02	Chenat Nair	..	..	..	..	..	105	..	..	..	..	429	..	55	589
	Dhoni	..	..	..	..	..	..	..	..	..	..	14	..	..	14
	Puliampalli	..	..	..	..	..	..	..	..	..	..	10	..	..	10
	Thampurattipottai	..	..	..	..	..	..	..	60	..	..	15	..	..	75
	Total	..	..	..	..	..	**105**	..	**60**	..	..	**468**	..	**55**	**688**
1902–03	Chenat Nair	..	467	..	..	..	150	106	..	..	..	433	..	12	1,168
	Dhoni	..	367	..	..	..	..	..	..	..	..	15	..	..	382
	Puliampalli	..	..	..	..	..	..	..	..	..	..	10	..	..	10
	Thampurattipottai	..	..	..	..	..	..	..	60	..	..	15	..	..	75
	Total	..	**834**	..	..	..	**150**	**106**	**60**	..	..	**473**	..	**12**	**1,635**
1903–04	Chenat Nair	..	..	..	..	..	..	..	..	..	..	488	..	..	488
	Dhoni	No information up to 1909–10.													
	Puliampalli														
	Thampurattipottai														
1904–05	Chenat Nair	..	..	..	..	..	..	..	..	..	..	393	..	..	393
1905–06	Do.	..	..	..	..	..	..	..	..	..	..	1,012	..	..	1,012
1906–07	Do.	..	..	..	..	..	..	..	..	..	..	18	..	..	18
1907–08	Do.	..	..	..	..	..	..	..	..	..	..	417	..	..	417
1908–09	Do.	..	..	..	..	..	..	..	..	..	..	393	..	..	393
1909–10	Do.	..	..	..	..	..	..	..	..	..	..	401	..	..	401

1910–11 ..	Chenat Nair ..	..	..	..	..	..	..	..	..	..	..	..	420	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Puliampalli ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	125	..	..	..	..	..	..	..
	Total ..	..	..	..	..	..	..	..	125	..	..	..	420	7,230	143	7,918
1911–12 ..	Chenat Nair ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	35	..	..	..	..
	Puliampalli ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	1,777	..	..	..	..	..	..	..
	Total ..	..	..	..	..	..	..	..	1,777	..	..	35	416	8,446	..	10,674
1912–13 ..	Chenat Nair ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	20	65	..	..	..
	Puliampalli ..	..	..	..	..	..	..	..	..	..	..	..	19	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	39	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	886	..	..	..	..	..	..	..
	Total ..	..	..	..	..	..	..	..	886	..	..	20	123	7,430	..	8,459
1913–14	.. Chenat Nair ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	..	51	..	..	..
	Puliampalli ..	..	..	..	..	..	..	..	..	..	..	..	18	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	33	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	11	..	..	..	..	..	..	..
	Total ..	..	..	..	..	..	..	..	11	..	..	..	102	5,100	8	5,221
1914–15 ..	Chenat Nair ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	..	46	..	..	..
	Puliampalli ..	..	..	..	..	..	..	..	..	..	..	..	18	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	47	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	44	61	..	..	..	..	..	..
	Total ..	..	..	..	..	..	..	..	44	61	..	..	111	6,100	..	6,316
1915–16 ..	Chenat Nair ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	..	59	..	..	..
	Puliampalli ..	..	..	..	..	..	..	..	..	..	..	..	19	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	46	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	40	..	..	..	..	..	..	..
	Total ..	..	..	..	..	..	..	..	40	..	..	..	124	5,300	..	5,464
1916–17 ..	Chenat Nair ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	11	40	..	..	..	50	..	..	..	..	52	..	..	..
	Puliampalli ..	..	..	..	..	..	..	..	..	..	5	..	18	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	48	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	..	..	..	..	..	..	354	..	..	..
	Attapadi Block VI	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total ..	..	17	40	..	..	..	50	..	..	5	..	472	5,600	..	6,184
1917–18 ..	Chenat Nair ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	80	..	45	..	..	36	..	..	..
	Puliampalli ..	..	..	..	..	..	..	..	..	..	..	..	22	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	28	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	..	..	..	..	..	..	301	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	35	..	..	..	..	..	..	..
	Panakadan ..	..	..	..	..	..	..	..	..	..	..	..	125	..	..	..
	Total ..	..	..	..	..	..	..	80	35	4		..	512	5,000	..	5,672

Statement of past Revenue and Expenditure—cont.

Expenditure.

Year.	Name of Reserve.	Timber.	Fuel.	Bamboos.	Feed and up keep of animals.	Purchase of stores and repairs.	Repairs to roads and bridges.	Buildings and repairs.	Other works.	Demarcation.	Regeneration.	Fire protection.	Establishment.	Miscellaneous.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
		RS.	RS.		RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1918–19 ..	Chenat Nair	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	650	72	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	94	19	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	58	..	..	..
	Attipadi Blocks I to V	..	..	..	..	..	..	..	..	..	..	342	..	..	..
	Attipadi Block VI	..	..	..	..	..	..	10	..	..	..	..	..	..	..
	Silent Valley	..	..	..	..	..	..	..	..	..	..	336	..	..	..
	Panakadan	..	..	..	..	..	..	..	..	..	..	137	..	..	..
	Total	..	..	..	..	..	..	**10**	..	..	**744**	**964**	**7,173**	..	**8,891**
1919–20 ..	Chenat Nair	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	886	59	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	38	44	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	248	67	..	..	..
	Attapadi Blocks I to V	..	..	..	..	..	..	..	..	..	..	180	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	15	..	..	..	..	..	..	..
	Silent Valley	..	..	..	..	..	1,338	99	79	..	..	295	..	..	..
	Panakadan	..	..	..	..	..	100	..	..	..	..	131	..	..	..
	Total	..	..	..	..	..	**1,438**	**114**	**79**	..	**1,172**	**776**	**20,320**	..	**23,899**
1920–21 ..	Chenat Nair Exploitation division.	31,516	..	..	9,780	16,635	59,637	4,267	3,024	..	2,370	..	..	..	..
	Chenat Nair district	..	..	..	..	..	..	..	..	..		899	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	68	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	159	52	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	37	79	..	..	..
	Attipadi Blocks I to V	..	..	..	..	..	..	..	..	..	..	242	..	..	..
	Attapadi Block VI	..	..	..	..	..	1,031	533	..	..	41	..	..	..	..
	Silent Valley	..	..	..	..	..	223	49	..	..	..	290	..	..	..
	Panakadan	..	..	..	..	..	90	..	..	..	..	125	..	..	..
	Total	**31,516**	..	..	**9,780**	**16,635**	**60,981**	**4,858**	**3,024**	..	**2,607**	**1,755**	**21,300**	**218**	**1,52,671**
1921–22 ..	Chenat Nair Exploitation division.	43,382	..	..	20,344	7,954	22,582	19,945	36	..	2,580 *43	..	..	..	..
	Chenat Nair district	..	..	..	..	..	..	..	..	..	..	662	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	..	79	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	10	55	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	112	83	..	..	..
	Attapadi Blocks I to V	..	..	..	..	..	..	..	..	..	..	47	..	..	..
	Attapadi Block VI	..	..	..	..	..	1,243	495	236	..	..	..	..	..	..
	Silent Valley	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Panakadan	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	**43,382**	..	..	**20,344**	**7,954**	**23,825**	**20,440**	**272**	..	**2,745**	**926**	**43,256**	**259**	**1,63,403**
1922–23 ..	Chenat Nair Exploitation division.	45,790	..	..	5,108	..	9,824	9,469	751	5	1,425	..	..	..	..
	Chenat Nair district	..	..	..	..	..	..	..	..	..	..	938	..	..	..
	Dhoni	..	..	..	..	..	..	..	502	..	..	60	..	..	..
	Puliampatti	..	..	..	..	..	..	..	..	..	..	51	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	87	..	..	..
	Attapadi Blocks I to V	..	..	..	..	..	..	..	..	..	..	376	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	144	..	1,026	..	..	..	..	..
	Silent Valley	..	..	..	..	..	404	..	..	..	..	461	..	..	..
	Panakadan	..	..	..	..	..	170	..	..	..	..	150	..	..	..
	Total	**45,790**	..	..	**5,108**	..	**10,398**	**9,613**	**1,253**	**1,031**	**1,425**	**2,123**	**58,869**	**354**	**1,23,764**

1923-24	Chenat Nair Exploitation division.	71,743	..	..	10,435	8,993	22,455	1,443	..	64	..	..	..	905	..
	Chenat Nair district	..	..	..	..	..	1,459	..	..	..	2,718	771	..	..	..
	Dhoni	..	..	..	..	..	..	..	..	..	21	59	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	99	56	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	48	94	..	..	..
	Attapadi Blocks I to V	..	..	..	..	..	1,514	1,575	..	..	..	545	..	134	..
	Attapadi Block VI	..	..	..	..	..	746	17	..	..	..	50	..	..	..
	Silent Valley	..	..	..	..	..	1,549	1,850	..	..	..	314	..	..	..
	Panakadan	..	..	..	..	..	99	..	12	..	..	148	..	..	..
	Total	**71,743**	..	..	**10,435**	**8,993**	**27,822**	**4,885**	**12**	**64**	**2,886**	**2,037**	**79,060**	**1,039**	**2,08,976**
1924-25	Chenat Nair Exploitation division.	91,280	..	..	5,815	8,652 *26,089	12,018 *12,346	556 *,167,403	..	5,578	2,872	..	..	1,567	..
	Chenat Nair district	..	..	..	..	..	415	..	..	..	1,222	655	..	..	..
	Dhoni	..	..	..	..	..	..	48	..	..	58	49	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	51	131	..	..	..
	Thampurattopottai	..	..	..	..	..	..	..	..	..	42	81	..	..	..
	Attapadi Blocks I to V	..	..	..	..	..	1,895	1,305	..	..	..	463	..	..	..
	Attapadi Block VI	..	..	..	..	..	1,755	619	..	..	..	..	..	..	..
	Silent Valley	..	..	..	..	..	665	637	..	..	..	303	..	..	..
	Panakadan	..	..	..	..	..	80	..	..	93	..	..	..	..	..
	Total	**91,280**	..	..	**5,815**	**34,741**	**29,174**	**1,70,568**	..	**5,671**	**4,245**	**1,682**	**75,239**	**1,567**	**4,19,982**
1925-26	Chenat Nair Exploitation division.	1,32,234	10,853	..	3,998	10,706 *14,155	8,047 *17,478	877 *4,376	1,00,069	160	..	..	..	1,988	..
	Chenat Nair district	..	..	..	..	..	2,363	335	..	..	1,867	407	..	..	..
	Dhoni	..	..	..	..	..	..	100	..	..	170	7	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	6	5	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	35	..	2	..
	Attapadi Blocks I to V	..	..	..	..	..	313	2,476	..	160	..	526	..	553	..
	Attapadi Block VI	..	..	..	..	..	712	2,147	..	96	..	..	..	..	..
	Silent Valley	..	..	..	..	553	1,390	467	..	..	..	351	..	..	..
	Panakadan	..	..	..	..	..	1,047	..	..	..	..	..	..	..	..
	Total	**1,32,234**	**10,853**	..	**3,998**	**25,414**	**31,350**	**10,778**	**1,00,069**	**416**	**2,043**	**1,331**	**86,083**	**2,543**	**4,07,112**
1926-27	Chenat Nair Exploitation division.	1,56,390	1,830	..	2,309	..	7,505	772 * 5,193	42	20	..	..	..	..	..
	Chenat Nair district	..	..	..	..	..	*2,152 51	..	..	..	1,330	384	..	..	..
	Dhoni	..	..	..	..	..	..	54	..	..	..	35	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	14	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attipadi Blocks I to V	..	..	..	..	..	430	929	..	..	..	595	..	..	..
	Attapadi Block VI	..	..	..	..	..	124	9	..	129	..	..	..	..	..
	Silent Valley	..	..	..	..	..	533	246	..	219	..	370	..	..	..
	Panakadan	..	..	..	..	..	70	..	..	..	..	30	..	..	..
	Total	**1,56,390**	**1,830**	..	**2,309**	..	**10,865**	**7,203**	**42**	**368**	**1,330**	**1,428**	**84,189**	..	**2,65,414**
1927-28	Chenat Nair Exploitation division.	1,57,330	..	..	1,107	22,992	28,400	17,437	..	..	..	..	..	12,185	..
	Chenat Nair district	..	..	..	..	..	5,810	..	..	..	989	304	..	..	..
	Dhoni	..	..	..	..	..	70	23	..	..	..	14	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attipadi Blocks I to V	..	..	..	..	..	317 *1,353	363	..	..	..	569	..	..	..
	Attapadi Block VI	..	..	..	..	..	..	..	..	94	..	..	..	..	..
	Silent Valley	..	..	..	..	..	318 *1,522	189 2,648	..	111	..	395	..	..	..
	Panakadan	..	..	..	..	..	27	..	..	..	..	30	..	..	..
	Total	**1,57,330**	..	..	**1,107**	**22,992**	**37,847**	**20,660**	..	**205**	**989**	**1,312**	**83,848**	**12,185**	**3,38,470**

* Capital expenditure.

Statement of past Revenue and Expenditure—cont.

Expenditure.

Year.	Name of Reserve.	Timber.	Fuel.	Bamboos.	Feed and up keep of animals.	Purchase of stores and repairs.	Repairs to roads and bridges.	Buildings and repairs.	Other works.	Demarcation.	Regeneration.	Fire protection.	Establishment.	Miscellaneous.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
		RS.	RS	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1928–29 ..	Chenat Nair Exploitation division.	2,22,641	..	..	304	..	..	..	..	..	..	..	..	..	..
	Chenat Nair district ..	..	..	..	..	..	1,212	108	..	..	625	343	..	..	..
	Dhoni	..	..	..	..	..	49	45	..	..	275	32	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	213	303	..	..	..	550	..	..	..
	Attapadi Block VI ..	..	..	..	..	..	174	..	..	..	..	..	..	..	..
	Silent Valley	44,743	..	..	..	..	286 *8	475 * 227	..	..	123	366	..	..	..
	Panakadan	..	..	..	..	..	27	..	..	..	..	21	..	..	..
	Total ..	**2,67,384**	..	..	**304**	..	**1,969**	**1,158**	..	..	**1,023**	**1,312**	**73,855**	..	**3,47,005**
1929–30 ..	Chenat Nair Exploitation division.	1,53,382	3,555	..	..	8,848 304	19,185	8,016	1,193	..	..	..	..	2,123	..
	Chenat Nair district ..	..	..	..	..	..	1,043	205	1	..	2,009	530	..	..	..
	Dhoni	..	..	..	..	..	1,162	62	..	..	834	32	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	202	200	..	..	..	285	..	..	..
	Attapadi Block VI ..	..	..	..	..	..	164	4	..	..	..	..	..	..	..
	Silent valley	68,086	..	..	..	..	393	308	..	..	599	229	..	..	..
	Panakadan	..	..	..	..	..	103	..	..	..	..	19	..	..	..
	Total ..	**2,21,468**	**3,555**	..	..	**9,152**	**22,252**	**8,795**	**1,194**	..	**3,442**	**1,095**	**90,374**	**2,123**	**3,81,382**
1930–31 ..	Chenat Nair	45,392	..	..	..	..	725	245	107	29	1,449	464	..	..	..
	Dhoni	52	..	..	..	..	514	174 * 200	110	57	1,218	45	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	353	..	..	..	..	..
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	245	311	..	..	..	566	..	..	..
	Attapadi Block VI ..	..	..	..	..	..	105	51	..	..	..	..	..	..	..
	Silent Valley	68,500	..	..	..	..	322	404	90	..	284	393	..	..	..
	Panakadan	..	..	..	..	..	137	..	..	..	..	..	..	..	..
	Total ..	**1,13,944**	..	..	..	..	**2,048**	**1,385**	**307**	**439**	**2,951**	**1,497**	**48,455**	..	**1,71,016**
1931–32 ..	Chenat Nair	32,484	..	..	..	240	1,040 *81	1,380	33	35	1,620	447	..	..	..
	Dhoni	..	..	..	..	..	415	77	..	13	727	39	..	..	..
	Puliampalli	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Thampurattipottai ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Attapadi Blocks I to V ..	..	..	..	..	..	211	446	25	..	..	500	..	..	..
	Attapadi Block VI ..	..	..	..	..	41	173	57	..	..	..	..	..	..	..
	Silent Valley	42,473	..	..	..	..	284	538	100	..	453	344	..	..	..
	Panakadan	..	..	..	..	..	355	..	31	..	..	26	..	..	..
	Total ..	**74,957**	..	..	..	**281**	**2,568**	**2,498**	**189**	**48**	**2,800**	**1,356**	..	–	..

* Capital Expenditure.

CHAPTER VI.—STATISTICS OF GROWTH AND YIELD.

SECTION 1.—STATISTICS COLLECTED PRIOR TO THIS PLAN.

391. *Volume out-turn figures for Mesua ferrea and Palaquium ellipticum.*—The gross volumes of logs suitable for conversion, and the net out-turn, from every tree felled from 1928 in the Silent Valley and in the Kalladikode valley, have been entered in Form 3 maintained by the concerned ranges. Only such of the logs as could be profitably converted into sleepers or kolmarams have been taken into account, and the net out-turn is the volume of the sleepers or kolmarams passed at stump-site, as complying with current specifications. These statistics have been used in the preparation of local volume tables.

392. *Percentage rejections of sleepers.*—A certain percentage of sleepers is rejected at the sale depot, by the passing officer, and this has averaged 5 per cent for broad and metre gauge *Mesua* sleepers and 7 per cent for *Xylia* sleepers, during the past four years. These percentages will be adopted in calculating the yield of *passed* sleepers from future coupes.

393. *Regeneration in 'logged' areas.*—Three sample plots were enumerated for natural regeneration of valuable species in December 1927, in the 'logged' sholas of the Chenat Nair reserve. The enumerations were made by Mr. E. A. Lasrado ; the results are tabulated below :—

Enumeration of natural regeneration in 'logged' sholas of Chenat Nair Reserve.

Species of regeneration. (1)	Dhoni valley. (Shola heavily logged) Plot 1. Seedlings per acre. (2)	Sappal valley (Shola heavily logged) Plot 2. Seedlings per acre. (3)	Sappal valley (Shola not heavily logged) Plot 3. Seedlings per acre. (4)
1 *Calophyllum elatum*	223	24	64
2 *Mesua ferrea*	156	..	..
3 *Cullenia excelsa*	420	1	..
4 *Palaquium ellipticum*	363	71	..
5 *Machilus macrantha*	85	24	..
6 *Myristica attenuata*	112	106	82
7 *Hemicyclia elata*	53	39	46
8 *Garcinia indica*	77	29	22
9 *Holigarna arnottiana*	46	73	..
10 *Lansium anamalayanum*	48	101	16
11 *Dysoxylum malabaricum*	5	..	..
12 *Polyalthea fragrans*	34	51	16
13 *Canarium strictum*	24	9	..
14 *Cinnamomum zeylanicum*	29	11	4
15 *Artocarpus integrifolia*	10	4	..
16 *Diospyros indica*	10	12	..
17 *Bischofia javanica*	13	2	..
18 *Acrocarpus fraxinifolius*	8	230	4
19 *Eugenia gardneri*	12	53	8
20 *Dysoxylum tomentosum*	60	14	..
21 *Chukrassia tabularis*	..	560	..
22 *Strombosia ceylanica*	..	353	14
23 *Hopea parviflora*	..	3	204
24 *Pterospermum rubiginosum*	..	2	24
25 *Schleichera trujuga*	..	34	..
26 *Alstonia sholaris*	..	4	..
27 *Amoora canarana*	..	..	36
28 *Dillenia pentagyna*	..	..	14

394. *Girth increment of Coppice shoots.*—Coppice shoots in the Thampurattipottai reserve resulting from the fellings of 1904–05 were measured in December 1911 by Ranger

T. V. Arumugam Pillai. The results, recorded in an old Range journal for the reserve, are tabulated below :—

Statement of girth increment of Coppice shoots.

(Thampurattipottai reserve.)

Species.	Number of stems measured.	Average girth of a shoot in 7 years in inches.	Mean annual increment in girth, in inches.
(1)	(2)	(3)	(4)
1 *Odina wodier*	8	16	2·3
2 *Stereospermum chelonoides*	5	14·8	2·1
3 *Cleistanthus collinus*	12	11	1·6
4 *Adina cordifolia*	13	12·2	1·7
5 *Albizzia odoratissima*	6	12	1·7
6 *Xylia xylocarpa*	67	14	2·0
7 *Terminalia paniculata*	58	16·8	2·4
8 *Lagerstrœmia lanceolata*	7	15·3	2·2
9 *Terminalia belerica*	3	17·6	2·5
10 *Terminalia tomentosa*	3	19	2·7
11 *Grewia tiliæfolia*	5	18·6	2·7
12 *Anogeissus latifolia*	19	11·5	1·6
13 *Eugenia jambolana*	11	13·2	1·9
14 *Pterocarpus marsupium*	1	17	2·4
15 Aya	1	21	3·0
		Mean (all species).	2·2

SECTION 2.—STATISTICS COLLECTED FOR THIS PLAN.

395. (*a*) *Volume tables for shola species.*—From the gross and net volume figures referred to in Section 1, the Provincial Silviculturist has prepared local volume tables for *Mesua ferrea* and *Palaquium ellipticum* for Coupes I to III of the Silent Valley series and Coupe I of the Attapadi series. For Coupe IV of the Silent Valley and Coupe II of the Attapadi series, curves and tables were prepared by the writer on the same lines. Average curves were then drawn with values from the several separate curves, taking into consideration the number of trees involved in each case. The gross and net volumes read off from these curves have been used for the calculation of yield ; the volumes are tabulated below :—

I. Average Volume table for Mesua ferrea.

Number of trees measured.	Girth class in feet.	Gross volume in cubic feet.	Net volume in cubic feet.	Diameter class in inches.	Gross volume in cubic feet.	Net volume in cubic feet.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
24	5—6	44	21	16—20	34	**17**
628	**6—7**	**57**	**27**	20—24	47	**23**
1,100	**7—8**	**72**	**34**	**23—24**	**52**	**25**
1,033	**8—9**	**90**	**42**	**24—28**	**62**	**29**
660	**9—10**	**110**	**52**	**28—32**	**78**	**36**
309	**10—11**	**130**	**62**	**32—36**	**98**	**46**
142	**11—12**	**149**	**71**	**36—40**	**118**	**56**
76	12—13	165	80	**40—44**	**139**	**67**
23	13—14	178	87	**44—48**	**158**	**76**
10	14—15	190	92	48—52	174	**84**

II. Average Volume table for Palaquium ellipticum.

Number of trees measured.	Girth class in feet.	Gross volume in cubic feet.	Net volume in cubic feet.	Diameter class in inches.	Gross volume in cubic feet.	Net volume in cubic feet.
28	4—5	34	16	16—20	38	**18**
64	**5—6**	**52**	**25**	**20—24**	**57**	**27**
426	**6—7**	**73**	**35**	**23—24**	**66**	**32**
421	**7—8**	**94**	**46**	**24—28**	**78**	**38**
264	**8—9**	**113**	**56**	**28—32**	**100**	**50**
98	**9—10**	**130**	**62**	**32—36**	**122**	**59**
51	10—11	144	68	**36—40**	**137**	65
				40—44	**147**	70

Note.—Figures in bold type are reliable, others tentative.

396. It has been prescribed that volume tables should be prepared separately for the different associations distinguished in the sholas. Since the average figures available have to be applied to all associations, a general average for *Cullenia-Palaquium* and *Palaquium-Mesua* associations has been given in Table I. Separate figures are available for the *Palaquium-Mesua* association and are given below :—

III. Volume Table for Mesua ferrea in the Palaquium-Mesua association.

Girth class (breast height over bark) in feet. (1)	Number of trees measured. (2)	Gross out-turn in the round in cubic feet. (3)	Net out-turn, sleepers in cubic feet. (4)
3—4	..	22	10
4—5	..	30	15
5—6	..	40	20
6—7	108	**52**	**25**
7—8	255	**66**	**30**
8—9	413	**82**	**38**
9—10	213	**102**	**50**
10—11	86	**124**	**62**
11—12	30	144	72
12—13	16	156	78
13—14	4	166	82
14—15	..	173	85
15—16	1	180	87

Note.—Values not in bold type are tentative.

397. (*c*) *Volume table for Xylia xylocarpa.*—A similar curve was drawn for *Xylia xylocarpa* felled in the Kalladikode valley. The number of trees involved is not sufficiently large to give reliable data, but in the absence of other statistics, these values have been adopted.

Number of trees measured. (1)	Girth class in feet. (2)	Gross volume in cubic feet. (3)	Net volumes in cubic feet. (4)	Diamater class in inches. (5)	Gross volume in cubic feet. (6)	Net volume in cubic feet. (7)
112	**5—6**	**35**	**17**	**19—20**	**32**	**16**
44	**6—7**	**44**	**19**	**20—22**	**35**	**18**
15	**7—8**	**50**	**21**	**22—24**	**38**	**18**
2	8—9	82	24	**24—28**	**48**	**20**
4	9—10	106	29	28—32	68	22
				32—36	92	26

Note.—Values printed in bold type are fairly roliable.

All the curves have been filed with the working plan records.

398. (*d*) *Enumeration technique and the percentage of enumeration adopted.*—Since there was no past experience of enumerations in tropical rain forests, from which the minimum percentage of enumeration necessary to give a reasonably correct estimate of the total stock could be fixed, it was decided to conduct a complete enumeration of selected species over a considerable area, from the results of which a minimum could be fixed.

The forest was divided into compartments of about 300—1,000 acres in extent, with natural features or existing paths as boundaries. A base line was run along the longest side of a compartment or of a series of adjacent compartments by cutting the undergrowth to a width of 4 to 6 feet. The line was as straight as possible, inevitable changes in direction being made always at right angles, but returning to the original direction after surmounting the obstacle which necessitated the departure.

The line was surveyed with " trailer tape and Abney " and numbered pegs were driven into the ground at intervals of two horizontal chains.

Strip lines were cut usually at right angles to the base line, but always parallel to one another, about 3 feet wide and sufficiently cleared of undergrowth to be discernible for a few weeks—i.e., until check enumerations could be completed.

Strip lines were cut at every 4 chains along the base lines for three compartments in the Silent Valley (compartments 4, 5, and parts of 3, of 1,891 acres) and all trees above a breast height diameter of 12 inches belonging to certain specified species were enumerated in the following diameter classes :—

12 to 16 inches, 16 to 20 inches, 20 to 22 inches, 22 to 24 inches, 24 to 28 inches, 28 to 32 inches, 32 to 36 inches, 36 to 40 inches and over 40 inches.

Sound and partly sound trees were distinguished in each diameter class.

The species enumerated were mainly :—*Mesua ferrea, Palaquium ellipticum, Calophyllum elatum, Hopea glabra, Artocarpus intergrifolia, Dysoxylum malabaricum, Eugenia sp.* and *Cullenia excelsa*.

The results were tabulated stripwar for *Mesua ferrea* and *Palaquium ellipticum* and the error for a 50 per cent enumeration was worked out :—

Statement of error in a 50 per cent enumeration over Palaquium-Mesua association (1,891 *acres*).

Diamater class.	Number of trees in diameter class.										
	12″–16″	16″–20″	20″–22″	22″–24″	24″–28″	28″–32″	32″–36″	36″–40″	Over 40″.	Total above 28″.	Grand total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Mesua ferrea.											
Actuals	1,217	1,174	593	369	619	360	169	82	37	648	4,620
Twice first set of alternate strips.	1,318	1,322	648	384	650	388	202	102	50	742	5,064
Twice second set.	1,116	1,026	538	534	588	332	136	62	24	554	4,176
Percentage variation from actuals.	± 8·3	± 12·6	± 9·2	± 4	± 5	± 7·8	± 19·5	± 24·4	± 35·1	± 14·5	± 9·6
Palaquium ellipticum.											
Actuals	4,589	3,474	1,353	666	771	263	87	23	10	383	11,236
Twice first set of alternate strips.	4,864	3,544	1,434	718	822	284	90	32	16	412	11,804
Twice second set ..	4,314	3,404	1,272	614	720	242	84	14	4	344	10,668
Percentage variation from actuals.	± 6	± 2·1	± 6	± 7·8	± 6·6	± 8	± 3·4	± 3·9	± 60	± 10·1	± 5

399. The following deductions emerged from the test-enumeration :—

(1) Generally speaking, the larger the number of trees in a girth class, the less the variation per cent.

(2) The variation per cent of *Palaquium* is less than that of *Mesua*, the incidence of the former species being higher than that of the latter, especially in the lower diameter classes.

(3) The variation per cent for each diameter class above 36 inches is so high that no reliable results could be based on a 50 per cent count, for each diameter class, but,

(4) The variation percent for all trees above 28 inches in diameter (7 feet 6 inches in girth) is only ± 14·5 per cent for *Mesua* and ± 10·1 per cent for *Palaquium*.

(5) For all trees enumerated, the variation is only ± 9·6 for *Mesua* and ± 5 per cent for *Palaquium*.

400. It was considered that a variation of about 15 per cent in the total number of mature and overmature *Mesua*, and of 10 per cent in that of *Palaquium*, would be sufficiently accurate for basing yield figures on, considering the accuracy of other available data. A 50 per cent enumeration was therefore decided upon.

401. To effect a 50 per cent enumeration, alternate strips 8 chains wide were enumerated, leaving the intermediate ones unenumerated.

The enumerations were checked, independently, by a forester other than the original enumerator of the strip, or the Working Plan Ranger, or the Working Plan officer ; such checks amounted to a minimum of 10 per cent of the strips, and up to 25 per cent in places.

The error allowed was 5 per cent of all trees of each species, and 10 per cent of trees within a diameter class.

The compartments were divided into sub-compartments whenever natural boundaries offered themselves for such division, and the enumeration results for each sub-compartment were maintained separately.

The enumerators noted, on the back of the enumeration sheet, information on the natural regeneration, advance growth and poles of the valuable species and the nature of the undergrowth and soil in the strip. They were also required to draw a sketch of the strip, on the lines of a stock map, showing blanks, rocks, reed-areas, any specially noteworthy grouping of trees, and the like.

When the limit of a compartment was not fixed by natural features, as when the upper limit of useful tree growth determined the boundary, strip lines reaching out to such a limit were measured with " trailer tape and Abney." These measurements were plotted on the map and the limit drawn in.

402. The results of enumeration over each compartment are tabulated in the following pages. The statements will also be useful in fixing yields for the second and subsequent felling cycles, with reference to the values of girth increment which should be available by that time.

SILENT VALLEY SERIES.

Reserve—Silent Valley.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartments 1 *and* 1 *a.*

Gross area 1 = 365 acres.
1 *a* = 208 acres.

Total = 573 acres.

Net area.—1 = 265 acres.
1 *a* = 208 acres.

Total .. 473 acres.

Diameter class.	12″–16″.		16″–20″.		20″–22″.		22″–24″.		24″–28″.		28″–32″.		32″–36″		36″–40″.		Above 40″.		Total.	
Species.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly. sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	144	3	123	4	84	8	33	9	42	21	28	17	13	15	13	10	8	25	488	112
Palaquium ellipticum	605	8	402	8	143	5	44	12	67	7	33	5	10	1	4	2	9	3	1,317	51
Calophyllum elatum	35	..	38	1	21	2	22	1	33	1	27	3	17	3	12	2	17	5	222	18
Cullenia excelsa	177	..	189	2	134	1	106	4	192	14	174	3	77	5	87	6	143	13	1,279	48
Hopea glabra	48	..	45	1	25	3	18	5	28	6	20	3	9	2	3	1	6	7	202	28
Acrocarpus fraxinifolius	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	1	..
Artocarpus integrifolia	4	..	12	1	6	..	5	1	7	3	3	1	2	1	2	..	1	..	42	7
Dysoxylum malabaricum	2	..	..	..	..	..	1	..	1	..	..	..	1	..	..	..	..	..	5	..
Eugenia sp.	5	..	5	..	1	..	2	1	11	..	5	1	1	1	2	..	2	..	34	3
Dalbergia latifolia	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Terminalia paniculata	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	2	..
Lagerstrœmia lanceolata	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

Note.—Enumerated after fellings.

Reserve—Silent Valley.

Percentage of enumeration—100.

ABSTRACT OF ENUMERATION.

Compartment 2.

Gross area—965 acres.

Net area—642 acres.

Mesua ferrea	490	30	388	50	241	56	123	44	173	101	107	64	58	58	22	61	41	40	1,643	504
Palaquium ellipticum	1,027	33	876	51	476	39	342	20	438	82	218	44	86	35	54	22	22	14	3,539	340
Calophyllum elatum	61	5	84	2	45	..	20	2	62	6	38	5	19	..	13	4	24	8	366	32
Culleria excelsa	522	8	524	28	342	11	367	28	509	49	472	27	341	57	283	40	480	116	3,840	364
Hopea glabra	28	..	13	2	7	2	1	2	11	1	1	2	4	1	..	..	..	..	65	10
Artocarpus integrifolia	24	..	23	4	14	4	10	1	21	4	17	3	4	4	2	..	3	..	118	20
Pœciloneuron indicum	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1
Dysoxylum malabaricum	4	..	8	..	..	..	6	4	..	2	6	..	6	..	4	..	..	..	34	6
Eugenia sp.	8	..	14	..	6	..	4	..	8	4	6	3	6	2	4	6	11	4	67	19
Cedrela toona	1	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	2	1

Note.—Enumerated after fellings.

Reserve—Silent Valley.

Percentage of enumeration—100.

ABSTRACT OF ENUMERATION.

Compartment 3.

Gross area—784 acres.

Net area—402 acres.

Mesua ferrea	472	20	484	58	222	30	120	19	190	52	129	42	65	20	35	23	21	18	1,738	282
Palaquium ellipticum	1,422	55	1,274	64	556	42	343	45	457	54	235	41	95	11	35	9	23	6	4,440	327
Calophyllum elatum	95	3	94	1	38	2	38	2	62	4	27	9	26	2	9	..	9	4	398	27
Cullenia excelsa	18	..	25	2	16	..	12	..	18	2	14	..	6	..	8	2	12	6	129	12
Hopea glabra	61	9	74	11	32	12	19	6	27	5	16	10	9	..	4	5	11	6	253	64
Acrocarpus fraxinifolius	1	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..
Artocarpus integrifolia	37	8	53	7	20	3	15	5	19	7	4	..	1	1	1	2	..	1	150	34
Pœciloneureon indicum	1	..	1	1	1	..	..	..	1	..	..	..	..	..	..	..	..	..	4	1
Dysoxlyum malabaricum	1	..	5	..	5	..	5	..	4	1	7	..	5	1	4	..	4	..	40	2
Eugenia sp.	2	..	11	..	6	..	7	..	10	..	5	2	6	..	9	..	3	3	59	5
Cedrela toona	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Dalbergia latifolia	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Lagerstrœmia lanceolata	..	..	1	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	3	..
Artocarpus hirsuta	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1

Note.—Portion included in Coupe II enumerated after fellings.

SILENT VALLEY SERIES—*cont.*

Reserve—Silent Valley.

Percentage of enumeration—100.

ABSTRACT OF ENUMERATION.

Compartment 4.

Gross area—774 acres.

Net area—627 acres.

Diameter class. Species.	12″–16″.		16″–20″		20″–22″.		22″–24″.		24″–28″.		28″–32″.		32″–36″.		36″–40″.		Above 40″.		Total.	
	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	478	10	462	23	214	15	140	14	236	22	113	17	44	13	24	7	8	5	1,719	126
Palaquium ellipticum	2,457	18	1,651	34	645	12	332	7	350	17	114	2	33	6	11	..	5	1	5,598	97
Calophyllum elatum	283	3	231	5	112	2	70	2	81	7	54	1	17	3	9	1	5	..	862	24
Cullenia excelsa	10	2	16	1	5	..	2	..	6	..	3	..	..	..	..	..	..	..	42	3
Hopea glabra	18	..	15	..	6	..	4	..	4	..	3	4	1	..	1	..	..	..	52	4
Artocarpus integrifolia	54	7	55	6	15	3	19	1	16	5	7	..	2	3	..	..	..	..	168	25
Artocarpus hirsuta	2	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..
Dysoxylum malabaricum	11	..	8	..	2	..	1	..	7	2	3	2	4	1	..	..	3	1	39	6
Eugenia sp.	13	..	29	..	18	..	15	..	21	2	12	2	7	..	5	..	1	..	121	4
Cedrela toona	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

Reserve—Silent Valley.

Percentage of enumeration—100.

ABSTRACT OF ENUMERATION.

Compartment 4 *a*.

Gross area—202 acres.

Net area—146 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	14	..	20	..	15	..	2	..	9	..	5	..	2	..	1	1	..	..	68	1
Palaquium ellipticum	1	..	2	..	2	..	1	..	3	..	..	..	..	..	..	..	..	..	9	..
Calophyllum elatum	93	..	109	..	61	..	32	..	66	4	38	2	29	1	22	1	7	..	457	8
Hopea glabra	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..
Artocarpus integrifolia	5	..	8	..	5	..	..	..	3	..	..	..	..	..	..	..	..	..	21	..
Dysoxylum malabaricum	..	..	..	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	3	..
Bischofia javanica	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	2	..
Eugenia sp.	4	..	4	..	..	..	3	..	6	..	9	..	3	1	4	..	..	..	33	1

Reserve—Silent Valley.

Percentage of enumeration—100.

ABSTRACT OF ENUEMRATION.

Compartment 5.

Gross area—869 acres.

Net area—661 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	543	5	470	16	266	11	132	8	216	22	126	12	62	10	18	8	11	4	1,844	96
Palaquium ellipticum	1,713	12	1,400	22	533	9	238	10	254	8	93	1	32	4	6	1	..	..	4,269	67
Calophyllum elatum	305	..	290	8	139	3	84	2	121	3	55	2	34	2	19	1	13	1	1,060	22
Cullenia execlsa	75	..	99	..	90	1	86	2	112	..	53	..	28	..	16	..	9	..	568	3
Hopea glabra	51	..	51	..	31	1	6	..	16	1	8	..	1	..	..	1	..	1	164	6
Artocarpus integrifolia	41	..	34	4	27	4	17	1	11	5	6	1	2	..	..	..	1	..	139	15
Dysoxylum malabaricum	4	1	3	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	11	1
Bischofia javanica	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	1	..	2	1
Eugenia sp.	12	..	23	..	12	1	9	..	16	3	9	2	6	..	5	..	3	..	95	6
Cedrela toona	1	1	3	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	6	1

Reserve—Silent Valley.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 6.

Gross area—867 acres.

Net area—618 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	177	3	187	4	147	3	86	11	121	17	66	10	23	5	13	4	3	..	823	57
Palaquium ellipticum	684	..	498	..	269	..	165	4	194	4	77	3	16	1	9	2	6	..	1,918	14
Calophyllum elatum	42	1	48	1	36	..	26	..	57	3	54	4	44	..	20	2	35	5	362	16
Hopea glabra	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	2	..
Artocarpus integrifolia	22	1	29	1	24	3	9	4	18	5	1	3	2	1	1	..	1	..	107	18
Pœciloneuron indicum	1,595	1	1,200	..	600	2	369	9	521	16	315	19	82	8	49	5	78	10	4,809	70
Dysoxylum malabaricum	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2	..
Eugenia sp.	3	..	5	..	5	..	2	..	9	..	9	..	3	..	1	1	2	..	39	1

Note.—Compartment 7 not enumerated.

Reserve—Silent Valley.

ABSTRACT OF ENUMERATION.

Gross area—779 acres.

Percentage of enumeration—50.

Compartment 8.

Net area—779 acres.

Mesua ferrea	120	6	131	16	116	6	65	3	142	12	59	15	30	4	12	2	31	9	706	73
Palaquium ellipticum	1,037	20	772	20	305	7	172	2	196	6	64	1	5	3	4	..	6	..	2,561	59
Calophyllum elatum	19	..	20	..	13	..	9	..	32	2	29	1	19	1	16	1	22	4	179	9
Artocarpus integrifolia	9	..	15	1	4	..	4	..	4	1	3	..	..	..	..	..	..	..	39	2
Pœciloneuoron indicum	1,887	90	1,540	84	821	48	547	38	846	62	411	32	151	17	78	7	196	32	6,477	410
Bischofia javanica	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	3	..
Eugenia sp.	10	..	19	..	12	..	5	..	7	..	2	..	..	..	1	..	3	1	59	1

Reserve—Silent Valley.

ABSTRACT OF ENUMERATION.

Gross area—869 acres.

Percentage of enumeration—50.

Compartment 9.

Net area—869 acres.

Mesua ferrea	166	7	148	6	66	2	61	2	82	6	57	6	28	1	12	3	10	3	630	36
Palaquium ellipticum	1.554	21	1,319	39	518	15	305	16	271	11	107	8	41	4	7	..	4	1	4,126	115
Calophyllum elatum	58	1	69	..	31	..	40	..	59	1	51	..	33	1	30	..	38	2	409	5
Cullenia excelsa	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..
Hopea glabra	1	..	4	..	1	..	..	..	..	..	..	..	2	..	..	..	..	1	8	1
Artocarpus integrifolia	37	3	35	4	20	3	12	1	15	5	7	1	2	..	2	1	1	..	131	18
Pœciloneuron indicum	3,365	92	2,617	127	1,179	72	941	56	1,255	122	682	69	260	26	140	20	241	46	10,680	630
Dysoxylum malabaricum	1	..	1	..	2	..	..	..	2	..	..	..	..	..	..	..	..	..	6	..
Bischofia javanica	1	..	1	..	..	..	..	..	4	..	2	..	1	..	3	..	2	1	14	1
Eugenia sp.	38	4	39	4	16	..	14	3	21	..	3	1	5	..	3	..	10	..	149	12
Chuckrassia tabularis	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

Reserve—Silent Valley.

ABSTRACT OF ENUMERATION.

Gross area—10 = 560 acres.
10 *a* = 240 acres.

Total .. 800 acres.

Percentage of enumeration—50.

Compartments 10 and 10 *a*.

Net area—10 = 560 acres.
10 *a* = 240 acres.

Total .. 800 acres.

Mesua ferrea	545	45	453	54	255	63	179	34	300	106	199	73	82	58	62	39	48	72	2,123	544
Palaquium ellipticum	2,731	85	1,699	86	551	27	311	19	277	24	97	7	26	4	8	1	3	3	5,703	256
Calophyllum elatum	122	1	134	3	62	3	47	1	88	3	58	4	29	..	19	1	21	10	580	26
Hopea glabra	1	..	2	..	1	..	..	..	..	..	..	..	..	..	1	..	..	1	5	1
Acrocarpus fraxinifolius	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Artocarpus integrifolia	100	3	62	3	21	3	22	2	22	4	3	..	3	..	1	..	..	..	234	15
Pœciloneuron indicum	1,367	60	962	74	436	50	299	47	447	87	247	54	83	24	45	12	55	42	3,941	450
Dysoxylum malabaricum	1	..	1	..	..	..	..	..	1	..	1	..	2	..	..	..	..	..	6	..
Eugenia sp.	27	..	29	2	14	1	5	2	16	4	14	2	14	2	2	..	2	4	123	17

Reserve—Silent Valley.

ABSTRACT OF ENUMERATION.

Gross area—978 acres.

Percentage of enumeration—50.

Compartments 11 *and* 11 *a*.

Net area—740 acres.

Mesua ferrea	860	45	924	80	400	48	408	60	541	110	341	94	168	83	71	38	58	83	3,771	641
Palaquium ellipticum	991	24	606	13	187	12	75	5	59	4	32	7	9	..	1	..	2	..	1,962	65
Calophyllum elatum	307	3	248	3	92	1	78	3	93	4	61	3	44	3	16	2	30	5	969	27
Hopea glabra	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..
Artocarpus integrifolias	44	1	48	5	88	2	12	3	23	6	8	..	3	1	1	1	1	1	228	22
Pœciloneuron indicum	22	..	20	2	10	1	6	3	8	2	14	1	7	1	..	..	6	2	93	10
Dysoxylum malabaricum	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	2
Bischofia javanica	4	..	2	3	10	..	14	2	17	..	10	3	6	2	4	..	6	5	73	15
Eugenia sp.	44	1	37	..	19	2	18	..	23	..	16	2	6	1	5	..	8	..	176	6
Cedrela toona	..	..	2	1	..	..	..	..	1	..	2	..	..	..	..	..	1	1	6	1
Pterocarpus marsupium	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	1	2	2

Reserve—Silent Valley.

ABSTRACT OF ENUMERATION.

Gross area—12 = 660 acres.
12 *a* = 513 acres.
Total :: 1,173 acres.

Percentage of enumeration—50.

Compartments 12 and 12 a.

Net area—12 = 417 acres.
12 *a* = 513 acres.
Total :: 930 acres.

Diameter class.	12"–16".		16"–20".		20"–22".		22"–24".		24"–28".		28"–32".		32"–36".		36"–40".		Above 40".		Total.	
Species.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	652	56	539	128	241	74	212	95	224	112	139	102	65	50	25	20	14	57	2,111	694
Palaquium ellipticum	940	52	606	44	218	18	132	15	118	32	47	12	20	6	3	1	3	4	2,087	184
Calophyllum elatum	102	7	101	4	60	5	36	2	67	9	33	13	18	1	11	8	13	8	441	57
Cullenia excelsa	21	1	25	1	11	3	14	4	13	1	15	7	5	1	1	..	5	8	110	24
Hopea glabra	61	5	58	16	40	11	20	11	41	16	14	14	7	5	..	1	8	2	249	81
Acrocarpus fraxinifolius	..	..	..	..	..	..	1	..	1	..	1	1	3	1	1	..	2	..	9	2
Artocarpus integrifolia	53	4	55	7	23	9	14	6	12	9	5	4	2	1	..	..	..	..	164	40
Pœciloneuron indicum	14	..	12	..	6	1	1	1	4	2	1	3	4	1	..	..	..	1	42	9
Dysoxylum malabaricum	2	..	6	..	4	..	1	1	2	1	1	..	1	..	1	..	2	..	20	2
Bischofia javanica	77	6	49	4	23	2	23	1	25	5	14	4	14	4	6	2	8	13	239	41
Eugenia sp.	17	1	11	4	11	..	18	3	15	4	10	4	2	..	3	..	8	5	95	21
Cedrela toona	..	..	1	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	3	..

Reserve—Silent Valley

ABSTRACT OF ENUMERATION.

Gross area—426 acres.

Percentage of enumeration—50.

Compartment 13.

Net area—285 acres.

Mesua ferrea	129	7	149	10	64	6	55	3	116	12	71	9	38	3	29	3	35	8	686	61
Palaquium ellipticum	188	5	190	7	95	5	76	2	88	9	77	5	25	2	19	7	6	2	764	44
Calophyllum elatum	11	..	8	..	9	..	5	..	11	..	10	1	5	..	4	1	4	..	67	2
Cullenia excelsa	237	4	258	8	171	1	134	3	274	7	207	5	96	2	90	4	126	7	1,593	41
Hopea glabra	52	2	27	2	17	5	9	3	20	2	9	1	1	2	5	1	6	3	146	21
Artocrapus integrifolia	6	1	6	1	10	1	1	1	11	..	2	..	1	..	1	..	2	6	40	10
Dysoxylum malabaricum	..	..	1	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	3	..
Bischofiajavanica	..	..	4	..	1	..	1	..	2	..	5	..	2	..	1	..	3	..	19	..
Eugenia sp.	2	..	1	..	1	..	2	..	2	..	1	..	1	..	2	..	1	..	13	..
Cedrela toona	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..

Reserve—Silent Valley

ABSTRACT OF ENUMERATION.

Gross area—14 = 1,080 acres.
14 *a* = 406 acres.
Total .. 1,486 acres.

Percentage of enumeration—50.

Compartments 14 and 14 a.

Net area 14 = 806 acres.
14 *a* = 406 acres.
Total .. 1,212 acres.

Mesua ferrea	1,089	62	1,011	72	483	38	388	55	648	108	354	64	173	38	86	30	96	41	4,328	508
Palaquium ellipticum	1,735	66	1,166	62	387	24	278	20	363	22	150	16	54	4	19	3	22	4	4,174	221
Calophyllum elatum	138	..	178	6	76	3	71	..	117	4	79	4	40	2	19	2	35	8	753	29
Cullenia excelsa	490	19	520	22	294	15	286	12	497	36	380	17	215	9	132	10	448	57	3,262	197
Hopea glabra	199	10	196	25	129	19	79	15	123	14	92	15	38	12	27	5	30	17	915	124
Acrocarpus fraxinifolius	..	..	3	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	5	..
Artocarpus integrifolia	103	8	80	8	80	4	25	3	28	6	27	3	3	2	..	1	2	..	298	35
Dysoxylum malabaricum	2	..	3	..	5	1	3	..	3	..	3	..	3	..	1	..	..	..	23	1
Bischofia javanica	1	..	1	..	3	1	..	..	2	..	2	..	..	..	1	..	5	..	15	1
Eugenia sp.	21	..	15	..	10	..	15	..	22	3	15	1	10	..	4	3	15	4	136	11
Cedrela toona	..	..	3	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	5	..

Reserve—Attapadi Block I.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 15.

Gross area—755 acres.

Net area—618 acres.

Mesua ferrea	240	10	195	23	119	13	72	11	187	27	105	25	42	9	23	4	74	23	1,057	145
Palaquium ellipticum	365	28	268	31	138	16	99	15	153	16	86	12	33	2	22	..	34	6	1,198	126
Calophyllum elatum	54	2	53	5	27	2	23	2	47	2	27	5	20	1	5	4	23	2	279	25
Cullenia excelsa	589	20	599	32	325	14	268	13	494	40	335	14	135	17	95	10	364	46	3,204	206
Hopea glabra	62	8	74	8	31	4	15	1	24	8	11	6	6	..	2	2	1	1	226	38
Acrocarpus fraxinifolius	6	..	1	..	1	..	2	..	2	..	..	..	..	..	1	..	2	..	15	..
Artocarpus integrifolia	23	3	24	3	12	2	5	1	13	4	7	1	1	..	..	..	71	1	92	15
Dysoxylum malabaricum	7	..	8	1	3	..	..	..	5	..	1	..	1	..	..	..	..	..	25	1
Bischofia javanica	1	..	2	..	1	..	1	..	2	..	1	..	..	..	..	..	5	1	13	1
Eugenia sp.	1	..	1	..	1	1	4	1	2	..	6	2	..	..	3	..	6	..	24	4
Cedrela toona	7	..	..	..	..	..	1	..	..	..	2	..	..	..	..	1	..	..	10	1
Lagerstrœmia lanceolata	5	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	..

Reserve—Attapadi Block I.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 16.

Gross area—1,064 acres.

Net area—971 acres.

Mesua ferrea	283	23	282	40	108	12	105	16	164	22	115	14	70	11	37	9	105	16	1,269	163
Palaquium ellipticum	671	42	623	20	277	15	199	11	310	19	178	12	72	9	32	6	53	10	2,415	144
Calophyllum elatum	62	..	49	1	31	1	21	1	43	4	22	1	19	..	10	..	49	2	306	10
Cullenia excelsa	532	16	476	15	210	12	233	9	324	15	243	12	152	7	121	9	363	31	2,654	126
Hopea glabra	19	1	16	..	8	..	4	1	10	..	7	3	1	..	3	..	4	..	72	5
Acrocarpus fraxinifolius	6	..	6	1	1	..	3	..	5	1	3	..	2	..	3	..	7	2	36	4
Artocarpus integrifolia	17	2	37	4	21	3	18	1	30	5	14	4	17	4	5	4	10	4	169	31
Dysoxylum malabaricum	11	..	9	..	2	..	3	..	7	..	3	..	4	..	..	..	2	..	41	..
Bischofia javanica	1	..	14	2	4	..	4	..	8	2	4	..	2	..	2	..	6	..	45	4
Eugenia sp.	3	..	5	..	1	1	4	2	7	1	3	1	4	1	4	1	15	..	46	7
Cedrela toona	..	..	4	..	..	..	1	..	2	..	1	..	..	..	..	..	1	..	9	..
Dalbergia latifolia	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	2	..
Pterocarpus marsupium	..	..	..	..	..	..	2	..	3	..	1	..	..	..	..	..	..	..	6	..
Lagerstrœmia lanceolata	8	..	11	..	7	..	1	..	4	..	4	..	2	..	..	..	2	..	39	..
Grewia tiliæfolia	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

Reserve—Attapadi Block I.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 17.

Gross area—427 acres.

Net area—427 acres.

Mesua ferrea	466	29	459	26	224	25	148	17	312	26	186	13	76	20	45	10	83	23	1,999	189
Palaquium ellipticum	287	8	206	11	74	8	46	..	45	1	16	1	4	..	1	..	4	1	683	30
Calophyllum elatum	59	..	68	3	31	1	34	..	56	..	28	1	23	..	8	..	16	..	323	5
Cullenia excelsa	94	2	96	6	64	6	69	5	84	6	75	5	43	2	30	2	93	13	648	47
Hopea glabra	45	1	31	2	13	..	3	2	16	1	15	3	..	1	1	..	2	3	126	13
Acrocarpus fraxinifolius	2	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	4	..	10	..
Artocarpus integrifolia	23	2	28	3	11	1	11	1	19	1	4	1	1	..	1	..	2	..	100	9
Dysoxylum malabaricum	4	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	6	..
Bischofia javanica	3	..	6	..	4	..	3	..	2	..	7	..	2	..	2	..	4	..	33	..
Eugenia sp.	1	..	..	..	2	..	1	..	3	..	1	..	1	..	1	..	10	1	20	1
Cedrela toona	1	..	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	4	..

Reserve—Attapadi Block I.

Percentage of enumeration—100.

ABSTRACT OF ENUMERATION.

Compartment 18.

Gross area—866 acres.

Net area—542 acres.

Mesua ferrea	117	13	92	13	46	4	32	6	51	11	43	4	29	2	23	6	30	7	463	66
Palaquium ellipticum	178	12	215	16	109	15	74	7	126	18	84	10	42	6	10	3	21	6	859	93
Calophyllum elatum	47	1	36	1	8	1	8	1	18	3	16	1	11	2	7	2	21	1	172	13
Cullenia excelsa	134	8	179	8	104	6	82	1	110	4	87	2	42	2	28	1	114	6	880	38
Hopea glabra	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..
Acrocarpus fraxinifolius	..	..	3	..	3	..	2	2	4	1	7	1	6	1	5	3	14	7	44	15
Artocarpus integrifolia	4	..	12	2	4	2	5	..	5	..	1	2	3	..	3	1	2	2	39	9
Dysoxylum malabaricum	..	..	1	..	1	..	..	..	3	..	..	..	..	..	1	..	1	..	7	..
Bischofia javanica	42	5	67	12	31	3	27	5	44	6	36	5	10	2	8	1	10	4	275	43
Eugenia sp.	3	..	5	1	8	..	7	1	7	5	10	5	14	1	9	2	28	4	91	19
Cedrela toona	6	..	11	..	1		3	..	4	..	..	..	..	..	..	..	..	29	..	..
Terminalia tomentosa	..	..	..	..	1	..	..	..	2	..	..	..	..	..	..	..	1	..	4	..
Terminalia paniculata	5	..	9	..	2	1	2	..	8	..	1	..	4	..	2	..	1	..	34	1
Dalbergia latifolia	49	14	52	12	26	12	18	7	40	12	39	11	19	6	13	4	15	2	271	80
Lagerstroemia lanceolata	147	6	189	12	108	12	91	5	171	19	112	15	66	7	36	1	39	6	959	83
Grewia tiliæfolia	163	14	57	5	9	1	6	1	4	1	2	..	..	..	..	..	..	..	241	22
Pterocarpus marsupium	10	..	18	3	18	..	9	1	16	8	10	1	4	..	4	..	..	..	81	13
Albizzia odoratissima	1	1	1	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	3	2

November 1985 Sunday

OCTOBER 1985					
S		6	13	20	27
M		7	14	21	28
T	1	8	15	22	29
W	2	9	16	23	30
T	3	10	17	24	31
F	4	11	18	25	
S	5	12	19	26	

24

DECEMBER 1985					
S	1	8	15	22	29
M	2	9	16	23	30
T	3	10	17	24	31
W	4	11	18	25	
T	5	12	19	26	
F	6	13	20	27	
S	7	14	21	28	

रविवार २४ नवम्बर कार्तिक सु १२ स २०४२

Page - 87 K
90
Silent Valley.
each species lasts
column. total.

November 1985 Saturday

OCTOBER 1985

S		6	13	20	27
M		7	14	21	28
T	1	8	15	22	29
W	2	9	16	23	30
T	3	10	17	24	31
F	4	11	18	25	
S	5	12	19	26	

23

DECEMBER 1985

S	1	8	15	22	29
M	2	9	16	23	30
T	3	10	17	24	31
W	4	11	18	25	
T	5	12	19	26	
F	6	13	20	27	
S	7	14	21	28	

शनिवार २३ नवम्बर कार्तिक सु ११ स २०४२

SILENT VALLEY SERIES—*cont.*

Reserve—Attapadi Block I.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 19.

Gross area—769 acres.

Net area—715 acres.

Diameter class. Species.	12″–16″.		16″–20″.		20″–22″.		22″–24″.		24″–28″.		28″–32″.		32″–36″.		36″–40″.		Above 40″.		Total.	
	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	571	47	530	31	262	31	178	24	280	43	156	29	59	12	27	4	34	17	2,097	238
Palaquium ellipticum	182	9	175	5	73	4	43	2	74	8	29	1	11	1	5	..	4	2	596	32
Calophyllum elatum	88	2	69	1	36	1	23	..	32	1	31	..	13	..	9	1	9	2	310	8
Cullenia excelsa	119	1	126	5	57	1	64	1	49	3	72	..	34	..	26	1	65	3	612	15
Acrocarpus fraxinifolius	1	..	2	..	1	1	3	..	5	..	5	..	4	..	3	..	40	6	64	7
Artocarpus integrifolia	41	2	40	4	20	..	22	..	17	1	11	..	3	..	2	1	2	2	158	10
Bischofia javanica	30	1	45	3	26	2	25	3	30	6	21	2	16	1	14	..	6	..	213	18
Eugenia sp.	11	1	13	2	13	1	11	1	23	2	22	..	15	..	18	1	15	7	141	15
Nechelium longana	19	..	17	4	12	..	4	..	7	2	5	2	..	..		..	..	..	64	8
Aglaia sp.	8	..	12	..	9	..	3	..	16	..	6	..	..	..	..	..	..	..	54	..
Cedrela toona	2	..	5	..	2	..	1	..	3	..	2	..	2	..	5	..	4	1	26	1
Dalbergia latifolia	..	..	..	..	1	..	2	..	2	1	1	1	1	..	..	..	..	..	7	2
Lagerstroemia lanceolata	..	..	..	..	1	..	..	..	3	..	2	..	..	..	..	..	..	..	6	..

Reserve—Attapadi Block I.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 20.

Gross area—306 acres.

Net area—306 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	9	2	2	..	..	..	2	..	1	..	2	..	..	..	..	..	..	..	16	2
Palaquium ellipticum	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	..
Calophyllum elatum	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1
Acrocarpus fraxinifolius	..	..	2	..	2	..	2	..	3	..	5	..	1	..	6	..	8	2	29	2
Artocarpus integrifolia	74	5	95	3	29	4	14	3	26	2	10	..	4	..	1	1	1	..	254	18
Bischofia javanica	82	4	91	9	35	1	29	..	43	2	21	1	7	1	4	..	2	..	314	18
Eugenia sp.	6	1	14	..	6	..	7	2	21	5	22	1	5	..	2	1	22	13	105	23
Cedrela toona	2	..	..	..	1	..	..	..	1	..	..	..	1	..	1	..	..	..	6	..
Dalbergia latifolia	14	..	16	3	9	..	5	..	10	3	5	..	..	..	..	..	..	..	59	6
Terminalia paniculata	..	..	1	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	3	..
Pterocarpus marsupium	6	1	7	2	3	..	3	..	10	1	6	2	..	..	..	..	..	..	35	6
Lagerstroemia lanceolata	5	..	5	1	6	1	4	..	8	..	4	1	3	..	1	..	1	..	37	3
Grewia tiliaefolia	2	..	2	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	7	..
Albizzia odoratissima	1	1	3	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	5	2

Reserve—Attapadi Block I.

Percentage of enumeration—100.

ABSTRACT OF ENUMERATION.

Compartment 21.

Gross area—906 acres.

Net area—906 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	81	5	67	6	25	1	19	..	24	6	10	2	4	1	1	1	4	3	235	25
Palaquium ellipticum	97	5	84	2	32	3	31	2	42	4	10	3	3	..	2	2	3	1	304	22
Calophyllum elatum	10	..	6	..	7	..	1	..	2	..	..	..	..	..	..	..	..	..	26	..
Cullenia excelsa	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2	..
Hopea glabra	14	1	12	1	6	1	3	..	4	1	4	..	1	..	2	1	2	1	48	6
Acrocarpus fraxinifolius	2	..	3	..	5	..	3	..	5	1	3	..	4	..	4	..	10	1	39	2
Artocarpus integrefolia	43	3	48	4	31	8	16	2	35	3	11	4	9	2	3	..	1	3	197	29
Artocarpus hirsuta	68	..	10	3	1	2	..	..	5	3	5	3	6	2	3	..	6	2	104	15
Artocarpus lakoocha	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	2	..	4	..
Bischofia javanica	81	5	84	5	32	6	32	2	57	11	31	7	9	1	4	..	8	1	338	38
Eugenia sp.	14	..	25	3	23	..	15	3	62	9	47	4	23	3	20	..	59	10	288	32
Cedrela toona	27	..	17	..	5	..	6	..	..	..	..	..	..	..	..	..	..	..	55	..
Tectona grandis	2	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	3	1
Dalbergia latifolia	126	11	97	14	33	5	29	8	69	16	43	13	19	4	10	1	27	3	453	75
Terminalia tomentosa	9	1	7	2	5	..	3	..	6	1	1	..	1	..	1	..	..	1	33	5
Terminalia paniculata	72	3	52	6	27	6	15	3	29	4	19	6	5	6	2	..	9	9	230	43
Pterocarpus marsupium	241	17	172	13	69	14	29	6	49	10	28	13	9	1	5	2	10	6	612	82
Lagerstroemia lanceolata	226	4	105	4	50	4	34	1	84	1	40	6	24	..	8	1	31	7	602	28
Grewia tiliaefolia	663	18	279	6	60	7	20	1	17	2	3	..	2	1	..	..	..	..	1,044	35
Albizzia odoratissima	198	8	102	6	27	3	10	3	13	1	3	..	2	..	..	..	..	..	355	21

Reserve—Attapadi Block I.

Percentage of enumeration—100.

ABSTRACT OF ENUMERATION.

Compartment 22.

Gross area—431 acres.

Net area—431 acres.

Mesua ferrea	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..
Palaquium ellipticum	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..
Hopea glabra	1	..	3	1	2	..	1	1	3	..	5	..	..	..	1	..	..	..	16	2
Artocarpus integrifolia	3	..	1	..	1	..	2	..	..	..	2	..	..	..	..	..	..	..	9	..
Artocarpus hirsuta	1	1	1	..	..	..	..	..	1	..	1	..	1	..	2	..	..	1	7	2
Bischofia javanica	5	..	2	2	3	..	1	..	4	..	1	..	..	1	..	1	..	..	16	4
Eugenia sp.	9	2	5	..	4	1	1	1	11	..	10	1	9	2	8	1	3	3	60	11
Cedrela toona	14	..	11	..	2	..	1	..	2	..	..	..	..	1	..	..	..	..	30	1
Tectona grandis	102	21	93	13	49	10	23	4	55	4	33	5	10	4	4	1	10	5	379	67
Dalbergia latifolia	153	23	92	23	48	11	28	2	26	13	17	6	6	4	3	1	4	4	377	87
Terminalia paniculata	9	..	9	1	9	1	2	3	8	4	5	3	1	1	..	1	8	1	51	15
Pterocarpus marsupium	198	19	197	39	115	24	70	22	101	29	50	23	25	6	11	5	4	13	771	180
Lagerstroemia lanceolata	117	6	107	7	72	4	56	3	77	3	35	4	24	2	4	1	5	..	497	30
Grewia tiliæfolia	543	30	249	26	106	7	44	5	24	6	3	1	..	..	..	..	..	..	969	75
Albizzia sp.	473	31	245	18	63	3	25	2	19	4	4	..	2	1	..	..	1	..	832	59

Reserve—Attapadi Block III.

Percentage of enumeration—100.

ABSTRACT OF ENUMERATION.

Compartment 23.

Gross area—519 acres.

Net area—519 acres.

Hopea parviflora	16	2	15	..	3	..	9	..	13	1	12	1	5	..	1	..	..	..	74	4
Tectona grandis	34	9	22	4	15	4	5	1	15	4	7	4	6	3	4	2	2	2	110	33
Dalbergia latifolia	53	13	52	16	18	6	13	5	24	6	13	4	8	3	14	4	6	..	201	57
Pterocarpus marsupium	63	10	34	6	19	3	15	4	21	4	9	3	4	4	1	1	1	..	167	35

Reserve—Panakadan.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 24.

Gross area—1,106 acres.

Net area—958 acres.

Artocarpus integrifolia	2	..	3	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	8	4
Artocarpus hirsuta	25	3	27	1	15	1	6	..	24	5	5	3	4	1	..	1	..	..	106	15
Cedrela toona	..	..	..	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	4	..
Tectona grandis	12	..	19	..	3	..	4	1	4	..	..	..	2	..	1	..	..	..	45	1
Dalbergia latifolia	46	3	19	3	8	..	4	..	2	..	3	..	..	1	..	..	..	..	82	7
Terminalia tomentosa	218	6	150	4	59	2	22	1	22	..	9	1	7	1	1	2	2	..	490	17
Terminalia paniculata	531	29	400	29	148	9	121	18	162	38	84	26	52	19	24	12	47	42	1,569	222
Pterocarpus marsupium	15	..	13	..	8	..	5	..	3	..	2	..	..	..	..	..	..	..	46	..
Xylia xylocarpa	1,344	50	789	53	279	26	157	15	147	19	54	6	13	..	2	..	4	..	2,789	169
Lagerstroemia lanceolata	317	5	227	3	141	3	74	2	108	5	43	2	24	1	16	..	9	3	959	24
Grewia tiliaefolia	366	14	218	19	57	5	14	2	22	3	8	4	2	1	..	1	..	..	687	49
Albizzia sp.	129	1	121	10	71	4	45	1	42	8	24	3	8	1	..	1	1	1	441	30

ATTAPADI SERIES.

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 1.

Gross area—364 acres.

Net area—355 acres.

Mesua ferrea	148	23	157	28	79	18	85	15	79	29	40	20	14	4	..	1	29	9	631	147
Palaquium ellipticum	600	30	408	32	153	5	69	5	53	8	16	3	3	..	..	..	1	1	1,303	84
Calophyllum elatum	8	..	15	..	6	..	6	..	5	..	10	1	5	..	3	..	8	..	66	1
Cullenia excelsa	502	23	332	18	182	13	112	2	61	3	23	1	8	..	2	..	2		1,224	60
Artocarpus integrifolia	20	4	6	1	7	..	1	..	2	..	..	..	..	..	..	..	..	1	36	6
Poeciloneuron indicum	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..
Bischofia javanica	17	1	23	2	11	2	10	2	8	3	8	3	6	2	..	2	9	4	92	21
Dysoxylum malabaricum	30	..	21	2	8	2	6	..	7	..	..	..	..	..	1	..	7	2	80	6
Eugenia sp.	10	2	10	1	17	3	15	..	20	4	5	2	5	..	1	..	14	5	97	17

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 2.

Gross area—468 acres.

Net area—468 acres.

Mesua ferrea	330	22	288	46	163	45	158	38	158	60	89	48	34	18	7	14	18	22	1,245	313
Palaquium ellipticum	1,371	43	849	43	349	17	229	18	160	10	37	4	1	1	1	1	2	..	2,999	137
Calophyllum elatum	26	..	35	1	11	..	11	..	14	..	16	1	11	1	8	..	8	1	140	4
Cullenia excelsa	670	15	583	25	474	40	307	19	171	17	50	2	11	..	5	..	33	4	2,304	122
Acrocarpus fraxinifolius	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..
Artocarpus integrifolia	34	1	8	3	8	..	4	..	2	2	1	..	..	..	..	..	..	..	57	6
Poeciloneuron indicum	63	2	39	1	20	2	8	2	11	2	8	2	2	..	..	..	..	1	151	12
Dysoxylum malabaricum	14	1	9	3	9	1	5	..	4	..	4	1	..	..	..	..	1	1	46	7
Bischofia javanica	6	..	11	2	5	..	5	..	12	1	10	3	2	3	1	2	15	11	67	22
Eugenia sp.	12	3	26	6	19	3	14	2	23	10	7	6	6	2	..	..	19	9	126	41
ela toona	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

ATTAPADI SERIES—*cont.*

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 3.

Gross area—349 acres.

Net area—349 acres.

Diameter class. Species.	12″–16″. Sound.	12″–16″. Partly sound.	16″–20″. Sound.	16″–20″. Partly sound.	20″–22″. Sound.	20″–22″. Partly sound.	22″–24″. Sound.	22″–24″. Partly sound.	24″–28″. Sound.	24″–28″. Partly sound.	28″–32″. Sound.	28″–32″. Partly sound.	32″–36″. Sound.	32″–36″. Partly sound.	36″–40″. Sound.	36″–40″. Partly sound.	Above 40″. Sound.	Above 40″. Partly sound.	Total. Sound.	Total. Partly sound.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	154	3	135	7	61	4	67	2	84	9	38	2	24	4	11	..	14	1	588	32
Palaquium ellipticum	683	6	573	18	275	7	150	9	147	7	50	4	19	..	8	1	12	2	1,917	54
Calophyllum elatum	11	..	16	..	8	..	9	..	12	..	10	..	10	1	6	..	14	..	96	1
Cullenia excelsa	483	3	329	2	276	2	213	1	200	2	22	..	4	..	..	..	1	..	1,528	10
Hopea glabra	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..
Artocarpus integrifolia	29	1	21	2	10	..	10	1	14	..	1	1	..	1	..	..	2	..	86	7
Poeciloneuron indicum	70	2	57	1	30	1	22	2	11	2	9	..	1	..	1	..	7	..	208	8
Vateria macrocarpa	9	..	4	..	5	..	4	..	5	..	2	..	4	..	2	..	11	1	46	1
Dysoxylum malabaricum	3	..	4	..	5	..	..	..	5	..	..	..	1	..	..	..	..	..	18	..
Bischofia javanica	8	..	6	..	6	..	5	1	4	2	3	..	2	..	..	..	4	4	38	7
Eugenia sp.	13	..	18	1	8	..	6	..	11	..	7	1	3	..	2	..	9	..	77	2
Nephelium longana	38	1	18	..	9	1	6	..	4	..	1	..	..	..	..	..	1	..	77	2
Lansium anamalayanum	3	..	2	..	3	..	..	..	..	..	..	..	..	..	..	..	..	1	8	1
Aglaia	13	..	12	..	7	..	5	..	9	..	2	..	3	..	..	..	10	..	61	..
Cedrela toona	1	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	3	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 4.

Gross area—376 acres.

Net area—376 acres.

Diameter class. Species.	12″–16″. Sound.	12″–16″. Partly sound.	16″–20″. Sound.	16″–20″. Partly sound.	20″–22″. Sound.	20″–22″. Partly sound.	22″–24″. Sound.	22″–24″. Partly sound.	24″–28″. Sound.	24″–28″. Partly sound.	28″–32″. Sound.	28″–32″. Partly sound.	32″–36″. Sound.	32″–36″. Partly sound.	36″–40″. Sound.	36″–40″. Partly sound.	Above 40″. Sound.	Above 40″. Partly sound.	Total. Sound.	Total. Partly sound.
Mesua ferrea	59	..	81	4	43	1	37	2	58	3	40	5	10	3	5	..	8	1	341	19
Palaquium ellipticum	565	5	446	4	243	4	170	2	182	1	58	1	28	1	10	..	7	..	1,709	18
Calophyllum elatum	5	..	11	..	5	..	3	..	6	..	5	..	6	..	2	..	7	..	50	..
Cullenia excelsa	222	2	200	1	181	2	170	1	180	5	142	..	104	..	57	3	93	6	1,349	20
Hopea glabra	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Artocarpus integrifolia	6	..	7	1	3	..	2	..	5	..	..	..	..	..	..	..	..	..	23	1
Poeciloneuron indicum	21	..	21	..	12	..	6	..	6	..	5	..	..	..	..	..	..	..	71	..
Vateria macrocarpa	23	..	38	..	28	1	21	..	43	1	29	3	22	..	17	..	62	1	283	6
Dysoxylum malabaricum	1	..	3	..	1	..	1	..	2	..	..	..	..	..	..	..	..	..	8	..
Bischofia javanica	2	..	2	..	1	..	..	..	..	..	1	..	..	..	..	..	3	..	9	..
Eugenia sp.	6	..	6	..	7	..	5	..	6	..	3	..	1	1	1	..	6	..	41	1
Aglaia	..	..	1	..	..	..	1	..	1	..	2	..	..	..	..	..	2	..	7	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 5.

Gross area—290 acres.

Net area—290 acres.

Diameter class. Species.	12″–16″. Sound.	12″–16″. Partly sound.	16″–20″. Sound.	16″–20″. Partly sound.	20″–22″. Sound.	20″–22″. Partly sound.	22″–24″. Sound.	22″–24″. Partly sound.	24″–28″. Sound.	24″–28″. Partly sound.	28″–32″. Sound.	28″–32″. Partly sound.	32″–36″. Sound.	32″–36″. Partly sound.	36″–40″. Sound.	36″–40″. Partly sound.	Above 40″. Sound.	Above 40″. Partly sound.	Total. Sound.	Total. Partly sound.
Mesua ferrea	76	2	95	1	38	2	30	..	57	3	30	2	14	..	5	..	7	1	352	11
Palaquium ellipticum	418	3	274	6	147	2	67	..	131	2	40	1	20	..	3	..	13	..	1,113	14
Calophyllum elatum	22	..	12	..	14	..	7	1	10	..	5	..	4	..	2	..	5	..	81	1
Cullenia excelsa	228	3	206	3	115	1	91	..	152	2	96	..	60	..	38	1	132	8	1,118	18
Hopea glabra	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..
Artocarpus integrifolia	9	..	17	..	..	..	2	..	1	..	1	..	..	..	..	..	..	..	30	..
Poeciloneuron indicum	15	..	12	1	11	..	5	..	7	..	1	1	..	..	1	..	2	..	54	2
Vateria macrocarpa	..	..	..	..	..	..	2	..	4	..	..	..	1	..	1	..	2	..	10	..
Bischofia javanica	4	..	3	..	2	..	3	..	1	..	1	..	..	..	..	1	7	..	21	1
Eugenia sp.	2	..	3	..	..	..	3		1	..	4	..	1	..	..	..	2	..	16	1
Nephelium longana	22	1	15	..	1	..	1	..	3	1	1	..	..	..	..	..	..	..	43	2
Aglaia	1	..	3	..	1	..	3	..	..	..	1	..	..	1	..	..	1	..	10	1
Dalbergia latifolia	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 6.

Gross area—298 acres.

Net area—298 acres.

Diameter class. Species.	12″–16″. Sound.	12″–16″. Partly sound.	16″–20″. Sound.	16″–20″. Partly sound.	20″–22″. Sound.	20″–22″. Partly sound.	22″–24″. Sound.	22″–24″. Partly sound.	24″–28″. Sound.	24″–28″. Partly sound.	28″–32″. Sound.	28″–32″. Partly sound.	32″–36″. Sound.	32″–36″. Partly sound.	36″–40″. Sound.	36″–40″. Partly sound.	Above 40″. Sound.	Above 40″. Partly sound.	Total. Sound.	Total. Partly sound.
Mesua ferrea	58	1	78	1	45	1	39	1	68	2	58	1	25	1	10	..	32	2	413	10
Palaquium ellipticum	518	1	442	4	157	1	112	2	104	1	71	..	34	..	5	..	6	1	1,449	10
Calophyllum elatum	8	..	6	..	12	..	3	..	9	..	6	..	3	..	2	..	6	..	55	..
Cullenia excelsa	344	2	286	1	189	..	139	..	173	1	123	1	98	..	56	..	209	..	1,617	5
Artocarpus integrifolia	17	..	7	1	2	..	3	..	5	2	6	..	1	..	..	..	2	..	43	3
Poeciloneuron indicum	8	..	8	..	2	..	1	..	2	..	4	..	2	..	..	..	1	..	28	..
Vateria macrocarpa	190	2	195	..	111	2	102	..	134	1	127	..	104	3	56	..	286	17	1,305	25
Dysoxylum malabaricum	..	..	2	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..
Bischofia javanica	2	..	3	..	3	..	1	..	2	..	3	1	..	..	..	..	1	..	15	1
Eugenia sp.	9	..	10	..	6	..	3	..	5	1	6	..	3	..	3	..	4	1	49	2
Nephelium longana	2	..	2	..	3	..	1	..	1	..	..	..	..	..	..	..	..	..	9	..
Aglaia	2	..	2	..	1	..	1	..	3	..	2	..	..	..	..	..	2	1	13	1
Cedrela toona	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

Reserve.—Attapadi Block VI.

Percentage of enumeration.—50.

ABSTRACT OF ENUMERATION.

Compartment 6 (*a*).

Gross area—158 acres.

Net area—158 acres.

Mesua ferrea	39	1	40	..	16	..	15	1	37	..	20	1	8	..	3	..	16	1	194	4
Palaquium ellipticum	225	2	201	..	74	1	51	..	57	1	18	1	11	..	2	..	1	..	640	5
Calophyllum elatum	5	..	6	..	2	..	6	..	8	..	3	..	2	..	1	..	6	..	41	..
Cullenia excelsa	132	..	114	..	63	1	55	..	79	..	41	..	39	..	11	..	70	..	604	1
Artocarpus integrifolia	4	..	1	..	2	..	..	..	2	..	1	..	..	..	..	..	..	..	10	..
Poecileneuron indicum	7	..	4	..	1	..	..	..	2	..	..	1	..	..	..	..	..	..	14	1
Vateria macrocarpa	60	1	44	1	28	1	20	2	46	1	34	1	22	1	12	1	59	6	325	15
Bischofia javanica	..	..	..	..	1	..	1	..	2	..	1	..	2	..	1	..	5	1	13	1
Eugenia sp.	3	..	4	..	4	1	3	..	4	1	3	1	1	..	1	..	5	..	28	3
Nephelium longana	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..
Aglaia	1	..	2	..	1	..	2	..	..	..	..	..	1	..	..	..	2	..	9	..
Cedrela toona	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 7.

Gross area—401 acres.

Net area—401 acres.

Mesua ferrea	63	2	57	3	46	1	31	4	40	9	28	8	17	3	9	2	5	1	296	30
Palaquium ellipticum	456	10	372	10	167	5	125	5	93	4	45	3	10	1	3	1	2	1	1,273	41
Calophyllum elatum	7	..	7	..	3	..	4	..	11	..	3	..	4	..	4	..	2	1	45	3
Cullenia excelsa	372	..	298	7	284	16	163	4	100	1	15	..	..	..	1	..	..	..	1,233	28
Artocarpus integrifolia	19	..	14	1	4	..	1	..	1	1	..	..	..	..	..	..	..	..	39	2
Poeciloneuren indicum	33	..	27	1	11	..	5	3	5	..	2	..	..	..	..	..	..	..	83	4
Vateria macrocarpa	7	..	8	..	4	..	4	..	13	..	7	..	8	..	2	..	14	..	67	..
Dysoxylum malabaricum	1	..	2	..	2	..	2	..	1	..	1	..	..	..	..	..	1	..	10	..
Bischofia javanica	4	..	2	..	1	..	2	..	2	1	3	..	4	1	..	1	4	1	22	4
Eugenia sp.	13	1	12	..	4	2	10	..	10	1	9	1	4	1	1	..	5	4	68	10
Nephelium longana	26	..	27	3	13	2	7	2	3	1	1	1	..	..	..	..	1	..	78	9
Aglaia	26	2	22	1	8	..	6	..	6	..	3	..	..	..	..	..	3	1	74	4

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 8.

Gross area—379 acres.

Net area—364 acres.

Mesua ferrea	194	7	157	12	101	7	82	16	102	14	46	14	24	3	13	5	14	3	733	81
Palaquium ellipticum	994	26	629	7	233	19	167	6	103	3	28	..	5	2	1	2	2	..	2,162	65
Calophyllum elatum	39	..	29	..	12	2	18	1	19	..	4	1	6	..	2	..	7	1	136	5
Cullenia excelsa	531	5	421	6	280	8	205	3	146	4	26	1	3	..	2	..	3	..	1,617	27
Acrocarpus fraxinifolius	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Artocarpus integrifolia	47	2	30	6	4	2	6	1	7	1	2	..	..	..	..	..	..	1	96	13
Poeciloneuron indicum	24	..	13	1	7	1	7	..	7	..	2	..	..	..	..	..	..	..	60	2
Dysoxylum malabaricum	12	..	14	..	3	1	4	..	..	..	1	..	..	..	..	..	..	..	34	1
Bischofia javanica	11	..	12	..	5	..	13	..	4	..	8	..	2	..	3	..	8	3	66	3
Eugenia sp.	24	1	19	1	12	2	12	..	13	1	9	..	3	3	..	2	13	5	105	15
Lansium anamalayanum	12	..	9	..	5	..	6	..	3	1	2	..	2	..	..	..	2	..	41	1

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 9.

Gross area—580 acres.

Net area—417 acres.

Mesua ferrea	134	5	105	8	68	3	59	1	47	3	15	4	12	2	3	1	2	..	445	27
Palaquium ellipticum	716	10	529	7	286	3	188	5	153	2	67	4	21	..	9	..	2	..	1,971	31
Calophyllum elatum	8	..	5	1	7	..	4	..	1	..	5	..	2	..	..	..	..	..	32	1
Cullenia excelsa	477	5	338	2	253	2	184	2	128	..	64	..	11	..	9	..	1	..	1,465	11
Hopea glabra	4	..	7	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	12	..
Artocarpus integrifolia	28	..	20	1	5	3	8	1	2	..	3	1	3	..	..	1	..	..	69	7
Poeciloneuron indicum	86	1	50	1	36	..	11	..	9	..	2	1	..	..	..	..	..	..	194	3
Vateria macrocarpa	10	..	5	..	4	..	3	..	3	2	7	..	4	..	4	..	1	1	41	3
Dysoxylum malabaricum	..	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	3	..
Bischofia javanica	4	..	3	..	3	..	6	..	1	..	1	..	2	..	2	..	4	1	26	1
Eugenia sp.	5	1	4	..	8	..	3	1	3	..	2	..	..	1	..	..	1	..	26	3
Nephelium longana	63	5	51	4	25	4	11	1	3	..	..	..	..	..	..	..	..	..	153	14
Aglaia	22	..	14	..	10	..	3	..	3	1	5	..	1	..	1	..	2	..	61	1

ATTAPADI SERIES—*cont.*

ABSTRACT OF ENUMERATION.

Compartment 10.

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

Gross area—281 acres.

Net area—219 acres.

Diameter class. Species.	12″–16″.		16″–20″.		20″–22″.		22″–24″.		24″–28″.		28″–32″.		32″–36″.		36″–40″.		Above 40″.		Total.	
	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	52	3	57	6	47	2	36	5	46	5	40	1	14	3	9	1	6	..	307	26
Palaqvium ellipticum	379	10	318	6	135	2	106	3	96	6	38	..	16	..	8	..	5	..	1,101	27
Calophyllum elatum	11	..	11	..	6	..	6	..	6	..	6	..	4	..	2	..	12	..	64	..
Cullenia excelsa	198	4	150	4	134	3	122	2	59	..	37	2	13	1	12	..	20	..	745	16
Hopea glabra	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Artocarpus integrifolia	11	1	14	2	10	2	5	3	10	..	3	1	3	..	..	..	..	..	56	9
Pœciloneuron indicum	31	..	20	1	13	..	6	..	8	..	2	..	..	..	..	..	..	..	80	1
Vateria macrocarpa	37	..	24	1	26	..	22	..	31	1	29	1	16	..	15	..	57	4	257	7
Dysoxylum malabaricum	7	1	3	1	3	..	6	2	1	..	1	..	1	..	..	..	1	..	23	4
Bischofia javanica	1	..	3	..	2	..	1	..	2	..	3	..	..	..	..	..	3	2	15	2
Eugenia sp.	3	..	4	..	2	..	5	..	3	..	1	..	3	..	1	..	..	..	22	..
Nephelium longana	8	..	6	1	4	..	3	..	..	..	2	..	..	..	..	..	..	..	23	1
Aglaia	14	..	11	1	10	..	6	1	5	1	1	..	2	..	1	..	1	..	51	3

ABSTRACT OF ENUMERATION.

Compartment 11.

Reserve—Attapadi Block VI.

Percentage of enumeration.—50.

Gross area—503 acres.

Net area—443 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	70	1	56	1	41	..	28	..	65	2	42	..	25	..	12	1	29	1	368	6
Palaquium ellipticum	522	7	343	6	149	3	73	2	147	2	62	3	30	..	9	1	16	1	1,351	25
Calophyllum elatum	19	..	11	..	4	..	8	..	10	..	12	..	8	..	9	..	29	..	110	..
Cullenia excelsa	434	1	277	1	175	1	138	1	210	..	134	..	88	..	58	..	256	1	1,770	5
Hopea glabra	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Artocarpus integrifolia	21	1	20	2	11	..	9	1	19	1	15	..	4	..	3	..	3	..	105	5
Poeciloneuron indicum	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Vateria macrocarpa	297	12	250	6	142	3	112	2	205	7	195	6	146	5	122	4	409	25	1,878	70
Dysoxylum malabaricum	1	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	4	..
Bischofia javanica	1	..	3	..	3	..	2	..	4	..	2	..	4	..	1	..	5	..	25	..
Eugenia sp.	..	..	1	..	2	..	..	..	4	..	1	..	2	..	1	..	7	1	18	1
Aglaia	8	..	3	..	..	..	1	..	6	..	4	..	1	..	..	..	5	..	28	..

ABSTRACT OF ENUMERATION.

Compartment 12.

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

Gross area—521 acres.

Net area—521 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	76	1	57	1	24	1	29	..	62	1	48	..	34	2	16	1	25	3	371	10
Palaquium ellipticum	886	13	804	9	358	5	251	2	330	9	210	11	107	..	44	3	54	3	3,044	55
Calophyllum elatum	16	..	18	..	8	..	4	..	6	..	4	..	7	..	8	..	9	..	80	..
Cullenia excelsa	517	1	385	..	252	1	208	2	296	3	239	2	174	1	127	1	365	6	2,563	17
Artocarpus integrifolia	16	1	12	4	7	1	4	..	8	2	6	..	..	..	1	..	1	..	55	8
Poeciloneuron indicum	13	..	7	..	4	..	1	..	3	..	..	..	..	..	..	..	..	..	28	..
Vateria macrocarpa	141	..	99	2	48	1	39	..	101	2	81	1	56	2	59	4	141	10	765	22
Dysoxylum malabaricum	1	..	1	..	..	..	2	..	2	..	1	..	2	..	1	..	..	..	10	..
Bischofia javanica	3	..	5	..	1	..	1	..	4	..	3	..	4	..	3	..	2	..	26	..
Eugenia sp.	1	..	2	1	3	..	1	..	4	1	1	1	..	..	3	..	3	1	18	4
Aglaia	4	..	..	..	1	..	7	..	4	..	3	..	1	..	1	..	2	..	23	..

ABSTRACT OF ENUMERATION.

Compartment 13.

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

Gross area—336 acres.

Net area—336 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	67	1	60	2	37	..	27	..	58	..	37	3	26	..	7	1	22	5	341	12
Palaquium ellipticum	659	5	476	5	207	1	102	1	163	4	90	..	26	1	8	..	12	..	1,743	17
Calophyllum elatum	18	..	14	..	8	1	6	..	5	..	9	..	6	..	4	..	12	..	82	1
Cullenia excelsa	354	1	241	..	127	1	84	1	139	5	87	..	79	..	42	..	143	..	1,296	8
Hopea glabra	..	..	..	..	1	..	..	..	2	..	1	..	..	..	..	..	..	..	4	..
Artocarpus integrifolia	24	..	19	1	12	1	14	..	14	3	8	..	1	1	1	..	1	1	94	7
Poeciloneuron indicum	11	..	8	..	1	..	..	..	2	..	2	..	2	..	2	..	6	..	34	..
Vateria macrocarpa	60	1	59	1	33	..	23	..	49	1	30	..	37	..	19	..	86	4	396	7
Dysoxylum malabaricum	1	..	..	..	..	..	..	..	2	..	4	..	2	1	2	..	..	..	11	1
Bischofia javanica	..	..	4	..	2	..	1	..	3	..	2	..	..	..	..	..	5	1	17	1
Eugenia sp.	5	..	3	..	2	..	1	..	9	..	2	..	2	..	..	..	5	..	29	..
Nephelium longana	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	2	..
Aglaia	4	..	3	..	..	..	..	..	7	..	2	..	1	..	1	..	..	..	18	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 14.

Gross area—275 acres.

Net area—275 acres.

Mesua ferrea	82	7	83	6	65	3	47	5	93	11	93	18	37	13	19	5	28	13	547	81
Palaquium ellipticum	947	19	600	11	256	4	161	3	146	8	106	1	19	..	5	..	10	1	2,250	47
Calophyllum elatum	32	1	18	..	14	..	10	..	13	..	14	1	10	..	6	..	12	..	129	2
Cullenia excelsa	429	8	430	8	255	7	190	4	333	10	251	11	137	5	79	..	306	17	2,410	70
Hopea glabra	1	..	1	..	1	..	..	..	2	..	1	..	..	..	..	..	1	..	7	..
Artocarpus integrifolia	25	2	44	1	20	1	14	3	11	4	19	3	6	..	1	..	3	2	143	16
Vateria macrocarpa	63	1	61	1	35	..	30	2	66	2	51	3	36	5	23	1	109	14	474	29
Bischofia javanica	7	..	7	..	11	..	3	..	11	..	7	2	7	..	1	1	10	..	64	3
Eugenia sp.	6	..	8	..	3	..	3	..	16	..	14	..	4	..	8	..	18	..	80	..
Nephelium longana	4	..	3	..	3	..	4	..	1	..	..	..	..	..	..	..	..	..	15	..
Aglaia	7	..	6	1	4	..	4	..	5	..	..	..	1	..	..	..	2	..	29	1
Artocarpus hirsuta	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..

Reserve—Attapadi Block VI.

Percentage of enumeration.—50.

ABSTRACT OF ENUMERATION.

Compartment 15.

Gross area—432 acres.

Net area—405 acres.

Mesua ferrea	157	10	147	17	97	10	76	18	111	11	56	13	38	10	13	10	8	10	703	109
Palaquium ellipticum	659	29	537	25	243	7	172	8	149	11	71	8	9	5	6	1	3	1	1,849	95
Calophyllum elatum	21	..	19	2	14	..	12	..	13	1	12	1	11	..	9	..	5	..	116	4
Cullenia excelsa	551	21	520	30	478	21	258	14	63	2	11	..	7	..	1	..	2	..	1,891	88
Hopea glabra	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..
Acrocarpus fraxinifolius	..	..	..	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	4	..
Artocarpus integrifolia	27	2	25	5	13	3	16	3	14	2	10	2	..	..	1	..	..	..	106	17
Poeciloneuron indicum	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Vateria macrocarpa	45	2	50	5	32	2	29	6	39	4	34	7	32	3	26	7	35	11	322	47
Bischofia javanica	24	1	35	..	25	1	11	..	17	2	8	2	6	1	3	..	10	2	139	9
Eugenia sp.	18	1	30	1	27	2	15	1	23	5	20	1	7	6	3	..	6	3	149	20
Nephelium longana	42	..	41	12	14	7	4	3	3	4	..	1	..	..	..	..	..	..	104	27
Aglaia	65	7	59	8	41	3	41	3	30	1	24	1	8	1	..	..	6	..	274	24
Cedrela toona	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 16.

Gross area—506 acres.

Net area—506 acres.

Mesua ferrea	27	6	148	10	101	5	85	5	137	17	132	23	50	12	27	6	45	25	852	109
Palaquium ellipticum	1,347	35	588	23	243	1	69	2	45	4	15	2	2	..	3	..	2	..	2,314	67
Calophyllum elatum	21		15	1	10	..	11	1	18	..	22	..	18	..	6	..	16	..	137	2
Cullenia excelsa	441	3	362	8	207	5	162	3	340	9	243	16	115	8	62	1	210	11	2,142	64
Artocarpus integrifolia	16	1	20	..	4	..	5	..	9	2	3	..	2	..	1	..	..	..	60	3
Vateria macrocarpa	36	1	34	..	13	..	11	1	27	..	26	..	13	..	16	..	27	6	203	8
Bischofia javanica	53	1	60	..	19	..	18	..	30	..	27	1	14	1	7	..	45	11	273	14
Eugenia sp.	13	1	24	2	15	..	7	..	12	1	12	3	9	1	7	1	10	8	109	17
Nephelium longana	1	..	2	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	4	1
Aglaia	3	..	2	..	5	..	..	..	1	..	2	..	..	..	1	..	3	..	17	..
Cedrela toona	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	2	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 17.

Gross area—466 acres.

Net area—466 acres.

Mesua ferrea	162	10	132	14	103	8	84	8	135	19	156	26	54	19	32	12	47	17	905	133
Palaquium ellipticum	1,943	49	815	24	290	10	109	7	71	3	33	1	6	2	..	..	1	..	3,268	96
Calophyllum elatum	51	1	31	1	29	1	34	..	32	2	37	2	27	1	17	..	32	1	290	9
Cullenia excelsa	687	11	527	16	322	8	230	3	427	7	290	10	151	5	76	1	307	17	3,077	78
Artocarpus integrifolia	13	..	8	..	7	..	4	1	4	..	4	..	1	..	..	..	..	..	41	1
Vateria macrocarpa	239	4	164	7	107	5	74	3	156	3	137	5	88	3	47	3	199	15	1,211	48
Bischofia javanica	5	1	6	..	7	2	10	..	14	..	10	1	7	2	3	..	28	15	90	21
Eugenia sp.	6	..	15	..	11	1	9	..	16	1	22	3	7	2	3	..	15	6	104	13
Aglaia	5	..	3	..	3	..	1	..	3	..	..	..	..	..	..	..	..	..	15	..
Cedrela toona	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..
Artocarpus hirsuta	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..

Attapadi Series.

ATTAPADI SERIES—*cont.*

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

Abstract of Enumeration.

Compartment 18.

Gross area—560 acres.

Net area—507 acres.

Diameter class.	12″–16″.		16″–20″.		20″–22″.		22″–24″.		24″–28″.		28″–32″.		32″–36″.		36″–40″.		Above 40″.		Total.	
Species.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	219	11	215	19	94	10	83	11	134	19	56	12	19	7	14	1	12	6	846	96
Palaquium ellipticum	810	22	457	14	133	4	61	3	77	7	21	3	4	..	2	..	1	..	1,566	53
Calophyllum elatum	20	1	15	1	9	..	12	..	8	1	8	1	13	..	3	..	10	..	98	4
Cullenia excelsa	483	9	373	7	209	2	148	4	212	2	171	2	76	2	36	1	135	13	1,843	42
Artocarpus integrefolia	15	2	4	..	4	..	1	..	2	1	1	..	..	..	..	..	..	..	27	3
Vateria macrocarpa	590	32	516	22	229	10	182	4	465	30	407	28	302	31	197	25	658	139	3,546	321
Dysoxylum malabaricum	..	..	..	..	..	..	1	..	1	1	..	..	1	..	..	..	1	..	4	1
Bischofia javanica	8	1	10	..	7	..	5	..	7	..	7	..	1	1	2	..	8	1	55	3
Eugenia sp.	13	..	18	3	9	..	2	2	16	1	14	..	6	..	4	2	18	2	100	10
Nephelium longana	36	3	30	3	14	1	7	2	6	6	3	..	..	..	..	..	1	..	97	15
Aglaia	3	..	5	1	2	..	2	..	2	..	..	1	..	..	2	..	..	..	16	2
Cedrela toona	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

Abstract of Enumeration.

Compartment 19.

Gross area—479 acres.

Net area—479 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	277	18	262	12	98	12	112	4	168	19	93	11	41	7	20	2	24	7	1,095	92
Palaquium ellipticum	714	13	420	12	105	2	69	1	57	6	17	..	7	..	1	..	..	..	1,390	34
Calophyllum elatum	44	1	33	..	9	..	8	..	22	..	5	..	10	..	3	..	7	2	141	3
Cullenia excelsa	350	7	282	6	148	4	113	1	158	4	144	2	52	1	35	..	99	4	1,384	29
Artocarpus integrifolia	12	..	7	..	6	1	..	..	2	..	1	..	..	..	..	..	..	..	29	1
Vateria macrocarpa	537	20	423	17	191	7	155	10	359	34	322	24	193	13	146	11	550	82	2,876	218
Dysoxylum malabaricum	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..
Bischofia javanica	49	1	35	5	8	..	10	1	9	1	7	..	5	..	2	..	6	3	131	11
Eugenia sp.	25	2	36	1	12	1	8	4	22	5	15	3	8	1	2	2	10	2	138	21
Nephelium longana	32	..	25	1	2	1	2	1	2	1	1	1	..	..	..	..	2	..	66	5
Aglaia	2	..	2	..	2	..	2	..	2	..	2	..	2	..	1	..	..	..	15	..
Cedrela toona	5	..	4	..	..	..	..	..	2	..	1	..	..	..	..	..	1	..	13	..

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

Abstract of Enumeration.

Compartment 20.

Gross area—804 acres.

Net area—804 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	519	27	522	39	203	29	116	12	260	31	100	19	39	7	13	3	9	1	1,781	168
Palaquium ellipticum	1,354	28	571	9	127	7	37	..	45	4	7	..	1	..	1	..	..	..	2,143	48
Calophyllum elatum	82	..	98	1	42	..	24	2	49	2	31	..	11	..	9	..	3	1	349	6
Cullenia excelsa	499	6	398	10	193	7	167	2	175	5	175	3	63	1	39	..	92	11	1,801	45
Artocarpus integrifolia	20	2	19	2	2	..	1	..	11	..	2	..	..	..	..	..	..	..	55	4
Vateria macrocarpa	1,259	35	1,175	36	562	19	417	18	1,017	38	882	42	441	36	374	25	1,132	185	7,259	434
Dysoxylum malabaricum	..	..	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	3	..
Bischofia javanica	2	..	6	1	1	..	3	..	5	..	3	..	5	..	1	..	8	..	34	1
Eugenia sp.	64	..	69	5	27	3	29	..	64	4	33	5	14	2	7	..	18	8	325	27
Nephelium longana	20	5	22	7	8	..	8	1	8	..	3	..	1	..	1	1	..	..	71	14
Aglaia	1	..	4	..	1	1	1	..	1	..	3	..	..	..	1	..	..	..	12	1

Reserve—Attapadi Block VI.

Percentage of enumeration—50.

Abstract of Enumeration.

Compartment 21.

Gross area—302 acres.

Net area—302 acres.

Species.	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	392	42	293	47	137	37	101	30	113	41	70	24	22	5	11	4	8	8	1,147	238
Palaquium ellipticum	297	7	204	9	72	5	48	3	48	8	10	3	6	1	4	..	2	2	691	38
Calophyllum elatum	37	..	36	2	13	..	24	..	28	..	13	1	4	2	1	..	2	..	158	5
Cullenia excelsa	251	5	221	12	192	15	162	17	93	7	55	7	19	2	16	2	15	2	1,024	69
Acrocarpus fraxinifolius	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..
Artocarpus integrifolia	8	1	5	3	3	1	2	1	7	1	1	..	2	..	..	..	..	..	28	7
Vateria macrocarpa	444	19	279	22	181	11	148	20	221	22	175	20	148	15	117	24	315	96	2,028	249
Dysoxylum malabaricum	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..
Bischofia javanica	17	..	25	..	8	..	8	1	11	..	12	..	4	2	4	..	7	3	96	6
Eugenia sp.	17	1	17	5	7		13	1	14	3	8	1	10	1	4	1	12	10	102	23
Nephelium longana	37	..	23	2	10	3	5	1	10	..	..	1	..	..	..	..	..	..	85	7
Aglaia	16	1	18	1	17	1	8	..	5	1	2	1	..	..	2	..	1	..	69	5

Reserve—Attapadi Block VI.

ABSTRACT OF ENUMERATION.

Gross area—418 acres.

Percentage of enumeration—50.

Compartment 22.

Net area—418 acres.

Mesua ferrea	641	55	474	92	239	40	214	45	279	64	168	46	75	23	41	8	38	24	2,169	397
Palaquium ellipticum	331	8	282	9	144	10	109	3	114	8	72	8	20	3	10	1	4	2	1,086	52
Calophyllum elatum	46	1	50	2	18	..	20	..	36	4	30	2	9	..	6	..	9	1	224	10
Cullenia excelsa	350	10	333	13	206	10	179	8	159	11	93	6	43	7	22	1	44	7	1,429	73
Acrocarpus fraxinifolius	1	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	5	..
Artocarpus integrifolia	16	1	17	3	4	2	6	5	10	2	7	1	2	..	..	..	1	..	63	14
Vateria macrocarpa	95	3	55	5	31	2	32	3	42	4	51	7	34	5	16	1	64	13	420	43
Bischofia javanica	14	1	9	1	6	..	5	1	18	2	9	1	9	1	3	..	17	1	90	8
Eugenia sp.	19	1	23	3	14	1	16	4	29	4	23	5	15	7	6	1	17	8	162	34
Nephelium longana	22	..	17	4	7	3	12	1	6	2	4	1	1	..	..	..	..	..	69	11
Aglaia	8	..	12	..	7	..	8	..	7	1	6	..	2	..	..	..	1	..	51	1

Reserve—Bolampatti Block II.

ABSTRACT OF ENUMERATION.

Gross area—450 acres.

Percentage of enumeration—50.

Compartment 23.

Net area—450 acres.

Mesua ferrea	734	113	555	109	244	43	220	57	228	94	98	48	35	34	18	19	13	17	2,145	524
Palaquium ellipticum	93	4	107	5	37	4	18	5	20	4	4	1	1	1	..	1	..	..	280	2
Calophyllum elatum	310	5	199	5	106	2	92	1	102	4	78	6	36	4	26	1	24	2	973	31
Acrocarpus fraxinifolius	..	..	..	..	1	..	1	..	2	..	3	..	2	..	..	..	2	..	11	..
Artocarpus integrifolia	20	4	28	6	13	3	14	3	17	9	7	4	4	..	4	1	6	1	113	31
Vateria macrocarpa	44	5	34	3	19	2	19	..	27	6	29	6	28	3	17	1	46	23	263	49
Bischofia javanica	11	4	6	1	6	..	5	..	7	2	6	2	2	1	2	1	3	2	48	13
Eugenia sp.	36	3	43	6	25	..	16	4	33	7	19	7	17	5	7	1	25	15	221	48
Nephelium longana	74	8	60	12	33	6	11	7	12	7	12	4	2	..	1	..	..	..	205	44
Aglaia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..

Reserve—Bolampatti Block II.

ABSTRACT OF ENUMERATION.

Gross area—520 acres.

Percentage of enumeration—50.

Compartment 23 (*a*).

Net area—510 acres.

Mesua ferrea	378	57	257	56	84	31	71	16	60	31	25	13	10	11	4	3	3	6	892	224
Palaquium ellipticum	..	..	1	..	..	..	1	..	..	..	2	..	..	..	..	..	..	..	4	..
Calophyllum elatum	494	28	367	34	156	13	115	7	150	14	74	10	48	9	27	3	20	6	1,451	124
Artocarpus integrifolia	16	1	18	7	13	1	6	4	8	2	4	..	1	..	..	1	..	..	66	16
Vateria macrocarpa	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..
Bischofia javanica	1	..	1	..	1	..	1	..	1	1	..	1	1	2	..	..	5	1	11	4
Eugenia sp.	37	4	37	9	21	4	10	2	12	5	10	8	4	5	4	2	8	10	143	49
Nephelium longana	51	7	23	10	3	7	8	3	4	..	3	..	1	..	1	1	..	..	94	28
Aglaia	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..

Reserve—Bolampatti Block II.

ABSTRACT OF ENUMERATION.

Gross area—198 acres.

Percentage of enumeration—50.

Compartment 24.

Net area—194 acres.

Mesua ferrea	64	5	41	3	15	1	5	3	21	8	8	6	5	2	1	1	3	4	163	33
Palaquium ellipticum	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Calophyllum elatum	217	8	174	14	75	4	54	7	70	7	40	2	29	1	18	1	19	2	696	46
Artocarpus integrifolia	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	1	3	1
Eugenia sp.	83	6	63	4	20	1	15	4	7	4	3	..	2	1	1	..	3	..	197	20

Reserve—Bolampatti Block II.

ABSTRACT OF ENUMERATION.

Gross area—267 acres.

Percentage of enumeration—50.

Compartment 24 (*a*).

Net area—267 acres.

Mesua ferrea	109	1	41	4	8	4	8	3	15	5	1	4	1	1	1	..	2	2	186	24
Palaquium ellipticum	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Calophyllum elatum	207	4	144	6	52	5	34	4	50	3	31	1	14	..	12	1	4	..	548	24
Artocarpus integrifolia	..	..	5	..	1	..	..	..	3	1	1	..	..	1	..	..	..	..	10	2
Vateria macrocarpa	246	8	211	3	91	8	113	1	209	12	197	7	131	9	99	5	253	50	1,550	108
Eugenia sp.	16	..	15	3	2	..	..	..	2	2	..	..	..	..	..	..	..	..	35	5

ATTAPADI SERIES—*cont.*

Reserve—Bolampatti Block II.
Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 25.

Gross area—814 acres.
Net area—723. acres.

Diameter class.	12"–16".		16"–20".		20"–22".		22"–24".		24"–28".		28"–32".		32"–36".		36"–40".		Above 40".		Total.	
Species.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.	Sound.	Partly sound.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Mesua ferrea	247	20	148	32	52	6	20	7	15	12	5	..	2	2	1	2	..	..	490	81
Palaquium ellipticum	8	..	11	..	6	..	1	..	3	..	2	1	..	..	..	..	..	..	31	1
Calophyllum elatum	124	2	76	1	36	3	31	4	47	4	27	2	15	1	7	2	7	3	372	22
Acrocarpus fraxinifolius	4	1	2	..	4	..	3	1	5	..	6	2	2	1	3	1	23	17	52	23
Artocarpus integrifolia	3	..	9	3	2	..	2	2	1	..	..	1	..	1	..	..	..	1	17	8
Dysoxylum malabaricum	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..
Bischofia javanica	11	..	8	1	8	..	6	..	11	3	11	4	10	..	4	3	8	..	77	11
Eugenia sp.	106	7	71	9	33	5	25	4	31	8	15	1	3	2	4	6	5	8	293	50
Nephelium longana	89	11	71	14	19	17	17	2	6	11	6	5	1	1	..	2	1	..	210	63
Aglaia	6	1	5	2	5	..	1	..	3	1	..	..	..	..	1	..	1	..	22	4
Dalbergia latifolia	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..
Cedrela toona	2	..	3	..	..	..	..	..	5	..	..	..	..	..	..	..	1	..	11	..

Reserve—Bolampatti Block II.
Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 25 (*a*).

Gross area—256 acres.
Net area—200 acres.

Mesua ferrea	171	8	98	7	36	7	18	5	11	8	6	5	..	2	1	..	..	1	341	43
Palaquium ellipticum	3	1	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	6	1
Calophyllum elatum	287	2	157	4	59	1	47	1	67	4	18	1	12	2	5	3	3	2	655	20
Acrocarpus fraxinifolius	2	1	3	1	2	..	1	..	1	..	3	..	..	..	..	..	2	..	14	2
Artocarpus integrifolia	3	1	4	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	8	2
Vateria macrocarpa	150	3	111	3	44	1	36	3	91	5	85	3	35	3	24	3	108	21	684	45
Bischofia javanica	9	..	5	..	3	..	2	1	5	2	3	2	..	1	..	..	3	..	30	6
Eugenia sp.	73	1	32	4	12	1	6	2	22	3	11	3	6	1	6	..	4	..	172	15
Nephelium longana	86	7	58	4	27	5	16	1	16	1	3	..	2	..	2	..	1	..	211	18
Lansium anamalayanam	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	3	..
Aglaia	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	..
Cedrela toona	2	..	3	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	6	..

Reserve—Bolampatti Block II.
Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 26.

Gross area—214 acres.
Net area—214 acres.

Mesua ferrea	578	42	419	42	158	23	77	19	109	33	36	15	12	9	1	4	7	8	1,397	195
Palaquium ellipticum	5	..	4	..	4	..	4	..	2	..	..	..	2	..	..	..	..	..	21	..
Calophyllum elatum	243	4	187	2	58	3	62	..	136	4	61	9	32	2	19	1	19	8	817	33
Artocarpus integrifolia	1	..	6	..	4	2	3	..	2	..	1	..	1	..	..	..	..	..	18	2
Vateria macrocarpa	418	8	370	14	168	5	135	7	372	19	291	18	215	18	145	20	486	167	2,600	276
Bischofia javanica	2	..	..	..	..	..	..	..	3	..	2	..	1	..	1	..	5	6	14	6
Eugenia sp.	56	5	54	6	23	2	15	3	51	12	41	6	17	1	14	3	21	12	292	50
Nephelium longana	19	2	8	..	4	1	2	4	3	2	4	..	..	1	1	..	..	..	41	10
Aglaia	..	..	..	..	2	1	2	..	1	..	..	..	..	..	..	..	..	..	5	1

Reserve—Chenat Nair.
Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 27.

Gross area—338 acres.
Net area—338 acres.

Mesua ferrea	454	28	440	44	249	31	146	24	238	64	114	39	49	26	18	9	27	18	1,735	283
Palaquium ellipticum	673	18	650	24	353	15	229	16	274	27	132	10	41	6	19	..	10	2	2,381	118
Calophyllum elatum	95	5	90	2	45	1	37	1	52	4	47	1	26	3	15	3	7	..	414	20
Cullenia excelsa	134	2	133	3	78	5	74	5	123	8	93	9	57	5	33	2	45	12	770	51
Artocarpus integrifolia	8	..	9	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	18	1
Bischofia Javanica	..	..	3	..	4	..	3	..	1	1	1	1	3	..	3	..	4	..	22	2
Eugenia sp.	33	1	28	1	15	3	9	4	25	7	23	6	10	2	13	1	25	8	181	33

Reserve—Chenat Nair.
Percentage of enumeration—50.

ABSTRACT OF ENUMERATION.

Compartment 28 (*a*).

Gross area—200 acres.
Net area—200 acres.

Mesua ferrea	83	19	36	17	18	14	7	7	12	12	8	6	3	4	..	1	1	2	168	82
Palaquium ellipticum	248	10	126	9	59	4	51	8	53	6	19	3	8	1	1	1	4	1	569	43
Calophyllum elatum	29	..	24	1	13	1	8	..	6	..	1	1	..	..	1	1	1	..	83	4
Cullenia excelsa	81	9	92	16	49	14	61	13	46	19	25	13	10	4	3	1	18	9	385	98
Acrocarpus fraxinifolius	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..
Poeciloneuron indicum	1	..	3	..	2	2	1	..	..	..	..	..	..	..	..	..	..	..	7	2
Dysoxylum malabaricum	23	2	3	1	1	..	1	2	..	1	..	..	..	..	..	..	..	..	28	6
Bischofia javanica	..	..	..	..	1	..	..	1	1	..	..	..	1	..	..	..	4	1	7	2

(e) *Percentage of total exploitable stand actually available for fellings.*

403. The enumeration data give the total number of *Mesua* trees in the different diameter classes, above the minimum exploitable size, actually existing in each compartment. Of this total, the trees available for felling are those which are not too hollow and which come under the prescribed marking rules. The percentage of trees which are likely to be felled, out of the total number of trees above the minimum exploitable girth in a compartment, was worked out from statistics of the stand above the minimum girth before fellings and the number of trees actually felled, in coupes I to IV of the Silent Valley series. The subjoined table was prepared accordingly :—

Coupes.	Percentage of exploited *Mesua* to total *Mesua* of				
	6′–7′	7′–8′	8′–9′	9′–10′	Over 10′ in girth.
Silent Valley					
I	39	70	69	65	53
II	..	56	63	70	55
III	77	77	77	77	77
IV	58	60	79	94	94

	Percentage of exploited *Mesua* to total *Mesua* of				
	6′–7′	7′–8′	8′–9′	9′–10′	Over 10′ in girth.
Average	58	66	72	76	70
Percentages adopted	60	66			

Based on the above results 60 per cent of trees above the exploitable girth was adopted for the number of trees available for fellings in the lowest exploitable diameter class and 66 per cent of trees in all the higher diameter classes. The same percentage has been adopted for second quality *Mesua* and for all other species, in the absence of other data.

(f) *Distribution of trees above 40″ in diameter.*

404. Since all trees above a breast height diameter of 40″ were clubbed together in one class during enumeration, other data have to be sought in order to arrive at the probable distribution of trees that are likely to be felled in diameter classes above this limit, so as to arrive at closer and more accurate values for the volume outturn from such trees. From figures available in Form 3 for past fellings in coupes I to IV of the Silent Valley series, the distribution of felled trees above this diameter was found to be :—

Diameter class.	40″–44″	44″–48″	Over 48″
Number of trees felled	170	86	74
Percentage of all trees over 40″ ..	51	26	23

Based on the above results, the total number of trees above a breast height diameter of 40″ that is likely to come up for fellings was assumed to be distributed among the 40″–44″, 44″–48″, and *over* 48″ diameter classes in the proportion of 50 : 25 : 25.

405. Having thus obtained the number of *Mesua* trees likely to be available for fellings from a compartment under each diameter class, the gross and net outturn from them was worked out with reference to the Average Volume Table I above. The number of passed sleepers was arrived at by applying the percentage of rejections given under Section I.

The anticipated yield shown in the statement in paragraph 473 is, of course, subject to the errors inherent in the several data detailed above.

(g) *Quality classes.*

406. Two quality classes have been recognized for *Mesua ferrea*, the higher quality occurring usually at elevations below 3,750′, in the *Cullenia-Palaquium*, *Palaquium-Mesua*, *Pœciloneuron-Palaquium* and *Cullenia-Vateria* associations and the lower, at elevations above 3,750′, in the *Mesua-Calophyllum* and the *Cullenia-Mesua* associations. In the higher quality class, the heights and maximum diameters are better than in the lower, but the incidence of the species per acre is considerably less.

407. Since no fellings have yet been executed in areas of the lower quality, no data are available for comparing the gross and net outturn from trees of the same diameter class but of different quality. For purposes of equalization of yield and of computing yield values, quality II has been estimated to be equal to 75 per cent of quality I.

Definite figures will be available only when fellings pass over the second quality. Form 3 has been prescribed to be maintained separately for associations allotted to each quality.

408. All *Dalbergia latifolia* in the Attapadi valley has been taken to be equal to first quality *Mesua* in volume calculations on account of its excellent height growth. The same species in the Panakadan reserve has been allotted to second quality ; they are so few in number that their allotment to any one of the two classes will make little difference in results.

All teak and *Pterocarpus marsupium* have been considered equal to second quality *Mesua* for the purpose of volume calculations.

(*h*) *Stem analysis.*

409. The following trees were felled and analysed :—

1. Two plantation grown teak, 54–55 years old, from Korma, Chenat Nair reserve,
2. One naturally grown rosewood (*Dalbergia latifolia*) at Dhoni, Chenat Nair reserve,
3. One naturally grown rosewood at Thadikundu, Attapadi Block I, near the Bhavani,
4. Two teak, one natural and the other apparently plantation grown, at Murigalai, Attapadi Block III, near the Bhavani.

410. Curves showing the relationship between age and height, age and girth and age and volume are filed with the working plan records. The subjoined tabular statement was prepared from the curves.

Result of stem analysis.

Age in years.	Height in feet.						Girth at breast height over bark in feet and inches.						Volume in c. ft.					
	Kurma Teak 1.	Kurma Teak 2.	Murigalai teak on river bank.	Murigalai teak on hill slope.	Dhoni rose-wood.	Thadikundu rosewood.	Kurma Teak 1.	Kurma Teak 2.	Murigalai teak on river bank.	Murigalai teak on hill slope.	Dhoni rose-wood.	Thadikundu rosewood.	Kurma Teak 1.	Kurma Teak 2.	Murigalai teak on river bank.	Murigalai teak on hill slope.	Dhoni rose wood.	Thadikundu rosewood.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
	FT·IN·	FT·IN.	FT·IN.	FT·IN.	FT·IN.	FT. IN.	FT.IN·	FT·IN.	FT.IN.	FT.IN·	FT.IN.	FT.IN·						
10	30 0	34 0	17 0	20 0	13 0	6 3	1 1	0 9	1 5	0 11	0 6	0 5	2	2	2	1	0	0
20	56 0	50 0	37 0	35 0	26 0	14 9	1 11	1 8	2 8	1 10	1 1	0 11	6	6	7	3	3	1
30	65 0	59 0	50 0	43 0	38 0	26 0	2 9	2 7	3 9	2 9	1 9	1 8	14	14	18	7	11	3
40	71 0	65 0	61 0	48 0	49 0	40 0	3 5	3 6	4 8	3 8	2 6	2 3	22	26	35	13·5	27	8
49	..	..	69 0	..	..	..	..	..	5 3½	..	..	..	..	..	54	..	..	..
50	75 0	70 0	..	52 0	58 0	58 0	4 1	4 3	..	4 5	3 5	3 0	36	41	..	22	49	19
54	76′ 7″	..	..	..	..	..	4 3¼	..	..	..	..	..	42	..	..	..	..	..
55	..	71′ 8″	..	..	..	..	..	4 6–1/8	..	..	..	..	..	46	..	..	..	..
60	..	..	..	55 0	66 6	75 0	..	..	..	5 3	4 9	3 10	..	..	..	30	80	34
70	..	..	..	58 6	73	..	..	..	..	6 0	6 2	4 9	..	..	..	40	120	56
80	..	..	..	61 0	..	..	..	..	..	6 9	7 9	5 7	..	..	..	51	171	84
85	..	..	..	..	81 6	..	..	..	..	..	8 7½	..	..	..	..	..	198	..
90	..	..	..	63 6	..	..	..	..	..	7 6	..	6 5	..	..	..	63	..	121·5
100	..	..	..	65 3	..	..	..	..	..	8 1	..	7 4	..	..	..	77	..	162
110	..	..	..	67 0	..	..	..	..	..	8 9	..	8 2	..	..	..	92	..	201
120	..	..	..	68 3	..	..	..	..	..	9 4	..	9 0	..	..	..	107	..	249
130	..	..	..	69 9	..	97 3	..	..	..	9 9	..	9 8	..	..	..	123	..	306
140	..	..	..	71 0	..	..	..	..	..	1 3	..	..	..	..	..	138	..	..
250	..	..	..	82 0	..	..	..	..	..	13 1	..	..	..	..	..	322	..	..

(*j*) *Sample plot measurements of teak and mahogany plantations.*

411. A teak tree near the Dhoni bungalow, 48″ in girth over bark at breast height, was felled in July 1932 and the rings counted. The tree was sub-dominant, plantation grown, 45 years old and 67 feet high. The bole was 26′ long, with a centre girth of 42″ (over bark) and so had a gross volume of 19·9 c.ft.

412. Sample plots, one square chain in extent, were laid out in the following plantations in August 1932 and the heights and girths at breast height of the dominant trees in each plot were recorded :—

(1) Mahogany and (2) teak round the Dhoni rest-house (about 45 years old), (3) the 1918 teak plantation in Dhoni reserve, (4) the Elival 1919 plantation, (5) the Mahogany 1919 plantation in Dhoni Reserve and (6) the Mahogany 1926 plantation, near the seasoning tank in Chenat Nair Reserve.

I. Mahogany trees near Dhoni rest-house—probably 45 years old. (All the dominant trees were measured.)

Number.	Girth at breast height in inches.	Height in feet.
1	1·25	68.5
2	68 75	69
3	68·25	63
4	54·5	68
5	78·5	83
6	76·8	75
7	48·0	70
8	86·3	80
9	72·75	78
Mean	**69·5**	**73**

II. Teak near Dhoni rest-house—probably 45 years old. (All dominant trees wer measured).

Number	Girth at breast height in inches.	Height in feet.
1	45·5	76
2	52·0	77·5
3	61·75	79·5
4	68·25	78
5	66·75	83
6	80·0	84·5
7	76·5	80·5
Mean	**64·4**	**80**

III. Teak, Dhoni 1919—

Number.	Girth at breast height in inches.	Height in feet.
1	21·75	44
2	24·4	52
3	24·25	44·5
4	25·4	50·5
5	26·5	49·5
6	20·1	49
7	27·25	50·5
8	27·9	52·5
9	27·5	49
10	21·5	45
11	15·25	42
Mean	**23·8**	**48**

IV. Teak, Elival 1919.

Number.	Girth at breast height in inches.	Height in feet.
1	28·75	62
2	24·0	58
3	24·0	60
4	22·25	55
5	29·25	57
6	30·0	56
7	19·25	50
8	23·0	57
9	33·0	59
10	28·75	53
11	27·5	53
12	22·0	48
13	26·25	51
Mean	**26 0**	**55**

V. Mahogany 1919, Dhoni.

Number.	Girth at breast height in inches.	Height in feet.
1	22·5	49
2	23·1	51·5
3	21·5	47·5
4	30·4	48·5
5	29·5	45
6	30·5	48·5
7	22·1	53
8	21·25	47
9	23·5	52
10	19·6	48
11	21·25	47
Mean	**24·1**	**49**

VI. Mahogany 1926, Chenat Nair.

Number.	Girth at breast height in inches.	Height in feet.
1	15·75	37·5
1	15·75	37·5
2	22·0	39
3	20·25	44
4	15·0	43
5	20·1	44
6	18·4	43·5
7	19·1	42·5
8	19·5	48
9	17·1	37
10	16·5	41
11	13·0	41·5
Mean	**17·9**	**42**

(*k*) *Natural regeneration in gaps created by selection fellings.*

413. Natural regeneration of valuable species was enumerated in 1930 over a hundred gaps created by selection fellings in coupes I and II of the Silent Valley. The species enumerated were *Mesua ferrea*, *Palaquium ellipticum*, *Calophyllum elatum* and *Artocarpus integrifolia*. Regeneration was divided into three classes : 'unestablished' if below nine inches in height, 'established' if between 9 inches and 2½ feet, and 'advance growth,' if above 2½ feet.

An analysis of the results showed that out of the hundred gaps, only five were completely devoid of natural regeneration, nine gaps contained no established seedlings, twenty-five did not have any regeneration of *Mesua ferrea* and twenty-six had no *established* regeneration of that species.

Twenty of these gaps were kept under observation for the next two years, the regeneration being re-enumerated in April 1931 and 1932. The results indicated (1) a heavy mortality per cent in unestablished seedlings of *Palaquium ellipticum*, (2) a much less mortality per cent in the case of unestablished seedlings of *Mesua ferrea*, (3) a smaller mortality per cent in the established seedlings of both species, and (4) a heavier mortality per cent, for both species, in bigger than in smaller gaps.

(*l*) *Girth increments of Coppice shoots.*

414. The girths of coppice shoots, in the Thampurattipottai Reserve, resulting from stumps of trees felled eleven years ago, were measured in 1931, with the following results :—

Girths of Coppice shoots eleven years old (Thampurattipottai reserve).

Species.	Number of shoots measured.	Average girth per shoot in inches.
Xylia xylocarpa	4	23·0
Terminalia paniculata	7	27·4
Terminalia tomentosa	1	20·0
Hymenodictyon excelsum	1	23·0
Pterocarpus marsupium	5	22·6
Albizzia odoratissima	1	24·0
Odina wodier	3	22·3
Tectona grandis	5	20·0
Anogeissus latifolia	3	22·0
Grewia tiliaefolia	1	24·3
Bridelia retusa	1	26·3
Mean girth increment for 11 years.	32	23·2

The mean annual girth increment is therefore 2·1 inches.

CHAPTER VII.—THE CAPITAL VALUE OF THE FOREST.

415. No satisfactory data are available for calculating the capital value of the forests dealt with under this plan, in a really scientific manner ; but the actual or probable cost values of the major part of them can be ascertained or worked out.

It has been mentioned in Chapter V that a large part of the forests which this plan deals with has been acquired by utilizing the powers conferred by the Land Acquisition Act. The cost values of the forests so acquired are therefore known. It is possible to compute the probable cost values of similar portions not so acquired on the basis of the costs awarded for the areas acquired.

416. In the case of Attapadi Block V and the Silent Valley Reserves, deciduous forests on the banks of the Bhavani were paid for at Rs. 10 an acre, shola forests at Re. 1, steep hill slopes, bare grassland or open jungle at 8 annas and barren rocky hills at 4 annas, an acre. In the case of Attapadi Block VI, first quality shola was paid for at Rs. 5, open grassland at 8 annas and barren rock at 4 annas, an acre.

417. The following reserves, or portions of reserves, were acquired for the amounts shown against them :—

	RS.	A.	P.
(1) Attapadi Block V, of 13,888 acres, was acquired for	11,379	4	0
(2) Attapadi Block VI, of 15,848 acres, was acquired for	91,571	12	0
(3) 785·5 acres of the southernmost portion of the Silent Valley reserve was acquired for	743	6	5

418. On the basis of the cost incurred for the acquisitions given above, the probable cost value of some of the reserves and of the forests included in the Selection and Protection Working Cicles can be arrived at.

419. (*a*) *The Silent Valley.*—The cost value of the whole of the Silent Valley Reserve, calculated on the basis of the rates paid for a part of it, works out as follows :—

	RS.
9,291 acres of good shola forest at Re. 1	9,291
2,360 acres of grassland at 4 annas	590
10,469 acres of high level shola and rock at 8 annas ..	5,234·5
Total ..	15,115·5
Add 15 per cent compensation	2,267·3
Total ..	17,382·8 or 17,383

420. (*b*) *The Selection Working Circle.*—The cost values of the forests included in the Selection Working Circle may be worked out as the sum of the cost values of the forests in the two felling series constituting it.

1. The Silent Valley Felling Series covers an area of 18,800 acres, out of which 11,651 acres valued at Rs. 11,363 are in the Silent Valley. The balance of 7,149 acres consists of 2,731 acres of shola 3,682 acres of deciduous forests and 736 acres of grassland, situated in Attapadi Blocks I and III and Panakadan Reserves. Evaluating the deciduous at the same rate as the shola forest and basing the rates on those paid for the adjoining Attapadi Block V (or the Silent Valley), these areas would cost Rs. 7,798. The total value of the Silent Valley Felling Series would thus amount to Rs. 19,161.

2. The Attapadi Felling Series covers an area of 16,192 acres, out of which 9,546 acres are in Attapadi Block VI, 2,727 acres in Bolampatty Block II and 3,919 acres in the Chenat Nair Reserve.

The proportionate cost of acquisition of the area in Attapadi Block VI is Rs. 88,000.

Assessing the remaining areas at the rates paid for Attapadi Block VI, the Chenat Nair area of 3,919 acres (3,063 acres shola and 856 acres deciduous) would cost Rs. 54,082 (Rs. 12 an acre plus 15 per cent compensation), and the area of 2,727 acres in Bolampatty Block II would cost Rs. 15,680 (Rs. 5 an acre plus 15 per cent compensation).

The total value of the Attapadi Felling series would then amount to Rs. 1,57,762.

The total value of the forests included in the Selection Working Circle would thus be Rs. 1,76,923.

To this should be added the cost of capital construction of buildings, roads and inpection paths, leading to or lying within the forests of the working circle. The total cost of these amounts to Rs. 55,790.

The total probable cost value of the forests of the Selection Working Circle may therefore be placed at Rs. 2,32,713 or Rs. 2·33 lakhs.

421. (*c*) The total probable cost value of the forests of the Protection Working Circle, calculated in the same manner, amounts to Rs. 31,538 or say Rs. 32,000.

422. No dependable data are available for calculating the cost values of other areas.

The cost value of the forests of the Selection Working Circle worked out above will be utilized in Chapter XI (Financial forecast and cost of the plan) for calculating the percentage of interest that the forests are anticipated to produce, in the shape of yield, for the next ten years.

PART II

Future management discussed and prescribed.

CHAPTER 1.—BASIS OF PROPOSALS.

SECTION 1.—GENERAL OBJECTS OF MANAGEMENT.

423. The primary objects of management are the exploitation of the shola forests for merchantable timber in such a manner that their essentially evergreen character will not be endangered but the proportion of merchantable species in them will be improved; the exploitation and improvement of the deciduous forests so as ultimately to obtain from them as high a sustained revenue as possible, consistent with the preservation of the factors of the locality; the improvement of the "logged" areas of the Chenat Nair reserve by the silvicultural treatment of the natural and artificial regeneration of the valuable species on them and the protection, in perpetuity, of the precipitous slopes and purely climatic forests at high elevations.

SECTION 2.—METHODS OF TREATMENT TO BE ADOPTED.

424. To attain these objects, the sholas and a part of the deciduous forests will be worked lightly under a modified selection system, followed by artificial regeneration of some of the gaps so created; the higher slopes and the purely climatic forests will be rigidly protected from fellings and fire; suitable areas in the deciduous forests will be clearfelled and artificially regenerated with teak, *Dalbergia latifolia*, *Pterocarpus marsupium*, and *Artocarpus hirsuta*; the Thampurattipottai reserve will be worked under the "pure coppice" system for fuel; the natural and artificial regeneration in the logged areas of the Chenat Nair reserve will be tended by climber-cuttings, cleanings and thinnings, at prescribed intervals; and provision will be made for the extraction of bamboos, the collection and sale of minor forest produce and for the experimental introduction of lac into the Kottanikunnu reserve.

SECTION 3.—WORKING CIRCLES, THEIR AREA AND DISTRIBUTION AND REASONS FOR THEIR FORMATION.

425. The area will be divided into seven working circles so that the method of treatment best suited to attain the object of management of a particular type of forest may be applied to that type.

The following working circles are therefore constituted :—

1. The Selection Working Circle,
2. The Teak Conversion Working Circle,
3. The Fuel Working Circle,
4. The Tending Working Circle,
5. The Bamboo Working Circle,
6. The Minor Forest Produce Working Circle, and
7. The Protection Working Circle.

1. *The Selection Working Circle.*

426. This working circle is formed primarily with a view to exploit the sholas for merchantable timber in such a manner as not to endanger their essentially evergreen character and so as to improve the proportion of merchantable species in them. A comparatively small area of deciduous forest, contiguous to the above, is included in this working circle as it is not extensive enough to form a separate unit.

The area of this working circle includes the following portions of the reserved forests named :—

	Area included in the working circle.
	ACS.
(a) *Shola forest*—	
The Silent Valley ..	11,651
Attapadi Block I ..	3,223
Attapadi Block VI ..	9,546
Bolampatty Block II.	2,727
Chenat Nair	3,063
Total ..	30,210

	Area included in the working circle.
	ACS.
(b) *Deciduous Forest*—	
Attapadi Block I ..	2,301
Attapadi Block III ..	519
Panakadan	1,106
Chenat Nair ..	856
Total ..	4,782
Grand total ..	34,922

2. *The Teak Conversion Working Circle.*

427. This working circle is formed with a view to replacing, in areas that are suitable for the purpose, the generally degraded deciduous forest with plantations of teak mixed with other valuable species where desirable. The species selected for this purpose are *Dalbergia latifolia* (Rosewood), *Pterocarpus marsupium* (Vengai) and *Artocarpus hirsuta* (Aini).

To secure this object, areas suitable for clearfelling and planting with teak have been selected wherever available and included in this working circle ; they are :—

	ACS.		ACS.
In the Chenat Nair Reserve ..	1,679	In the Puliampalli tope reserve	20
In the Dhoni reserve	45		
In Attapadi Block I	248	In Panakadan Reserve ..	250
In Attapadi Blocks IV and V.	464	Total ..	2,706

The method of treatment will be clearfelling which will be followed by artificial regeneration.

3. *The Fuel Working Circle.*

428. This comprises the Thampurattipottai reserve of 131 acres. The simple coppice system will be adopted as the crop is of the scrub type and the soil is too rocky to support a better type of forest.

4. *The Tending Working Circle.*

429. This working circle is formed for the purpose of regulating the tending of logged areas (shola or deciduous) of the Chenat Nair reserve not included in the Teak Conversion Working Circle, with the object of ensuring that such natural and artificial regeneration of valuable species as exists in them, shall survive and put on the maximum annual increment possible.

The total area of this working circle is 8,299 acres, all in the Chenat Nair reserve.

5. *The Bamboo Working Circle.*

430. In this working circle are included the bamboo areas of the Chenat Nair reserve, which will be worked on the basis of a sustained annual yield.

The area of this working circle is 4,039 acres.

The coupes will be worked on a rotation of three years.

6. *The Minor Forest Produce Working Circle.*

431. All the forests covered by this plan are included in this working circle.

Prescriptions for the experimental introduction of lac on *Schleichera trijuga* trees in the Kottanikunnu reserve, for the improvement and more effective utilization of the cardamom crop in the sholas, and for the realization of the value of other minor produce over the whole area, will be formulated in the plan for this working circle.

7. *The Protection Working Circle.*

432. This working circle will include three types of forest :—

(*a*) Beyond an elevation of about 4,500 feet above sea-level, the optimum conditions for the formation of a good quality tropical rain forest are on the wane, the trees get shorter and grow slower and the merchantable species tend to vanish. The hill-tops become precipitous and bare rocks are common. It is not an economic proposition to extract the few small-sized merchantable trees, generally *Mesua ferrea* and *Calophyllum elatum*, that may still be found scattered about. Further, such areas are often of climatic importance and protect the sources of important rivers like the Bhavani and the Kundipuzha.

(*b*) Certain areas on the inner slopes of the Bhavani were under shifting cultivation (kumri) by hill-tribes before reservation, and are now covered by an immature crop of miscellaneous species, largely coppice. These areas are so far removed from the plains and are so situated that their exploitation is never likely to pay. They will therefore be protected, until improved communications and high prices enable us to work them at a profit.

(*c*) Similar areas situated on the eastern slopes of Attapadi Block V, containing an immature mixed deciduous crop of teak, *Dalbergia latifolia* and *Pterocarpus marsupium*, twenty to thirty years old and mainly coppice, may be profitably exploited in the future—say, thirty years hence. These areas will be protected during the period of the plan and have therefore been included in this working circle.

The areas are distributed as follows :—

(*a*) High-level shola, precipitous slopes and grass land.—

	ACS.
Silent Valley Reserved Forest	10,261
Attapadi Block I	12,294
Attapadi Blocks II to V	10,660
Attapadi Block VI	5,435
Chenat Nair Reserve	2,836
Bolampatty Block II	647
Total	42,133

(*b*) Areas kumried, but unsuitable for exploitation—

	ACS.
Attapadi Block I	1,065
Attapadi Block V	2,398
Attapadi Block VI	867
Total	4,330

(*c*) Areas kumried before reservation but which might become suitable for exploitation in future :

	ACS.
Attapadi Blocks II, IV and V	2,738

(*d*) Areas permanently preserved as types of virgin shola—

	ACS.
1 Silent Valley	208
2 Chenat Nair	218
Total	426
Grand total	49,627

SECTION 4.—PERIOD OF THE PLAN.

433. The period of the plan is fixed at ten years.

With a view to removing the deteriorating overmature trees, of which there are a large number, as quickly as practicable, preliminary felling cycles of thirteen and fifteen years have been fixed for the two felling series of the Selection Working Circle.

Selection fellings, on the lines prescribed in this plan, were started in the Silent valley series in 1928–29, and in the Attapadi series in 1930–31.

The plan will therefore be in force for the period of ten years commencing in 1933–34 and closing at the end of 1942–43, thus coinciding with the balance of the preliminary felling cycles of the Selection Working Circle.

434. Our present knowledge of the rates of growth of the shola species and of the methods of regenerating them successfully is incomplete. Experiments intended to throw more light on these problems are prescribed in Chapter IX of Part II.

The periods of rotation for the Teak Conversion Working Circle have been arbitrarily fixed at 25 and 70 years for the different felling series in which the qualities of soil differ ; no definite information as to the rates of growth of teak in the localities concerned is now available.

It is expected, however, that at the end of the ten years' period of the working plan, it will be apparent as to whether big timber on the comparatively long rotation of 70 years can be grown on the better types of soil or not. It can then be decided whether it may not be advisable to grow all the teak on the one short rotation.

It is also expected that some figures will be available, as a result of the sample tree measurements prescribed, for the rates of growth of the shola species, in the light of which the felling cycle for the Selection Working Circle might be revised.

The plan should be taken up for revision in 1941–42, a year before it lapses.

CHAPTER II.—WORKING PLAN FOR THE SELECTION WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE CIRCLE AND CHARACTER OF VEGETATION.

435. Two types of forest are included in this working circle—the shola (or rain forest) and such portions of the deciduous forests as are not suited for clear felling and planting.

The sholas comprise the workable portions of the Silent Valley Reserve, Attapadi Blocks I and VI, the 'unlogged' sholas of Chenat Nair Reserve (Kalladikode valley and the Karimpuzha or the 'Lost valley', north of Palamalai) and the sholas of Bolampatty Block II, adjoining the north-eastern portions of Attapadi Block VI and clothing the Varadimudi plateau.

The deciduous forests lie (1) in Attapadi Block I, at the eastern end of Panthanthodu valley, and on the slopes to the west of Thadikundu, (2) in Attapadi Block III, round Murigalai, (3) at the lower end of Kalladikode valley, in the Chenat Nair reserve, and (4) in the Panakadan reserve.

436. The sholas contain a large variety of species of which the most prominent are :—*Cullenia excelsa*, *Palaquium ellipticum*, *Vateria macrocarpa*, *Poeciloneuron indicum*, *Calophyllum elatum*, *Mesua ferrea*, *Acrocarpus fraxinifolius*, *Artocarpus integrifolia*, *Hopea glabra*, and *Dysoxylum malabaricum*.

A very large proportion of the stand consists of one or more of the first four species mentioned above—species which are of comparatively small or negligible value at present. The most valuable species, *Mesua ferrea*, is distributed over the sholas at a rate varying from about three to eleven trees per acre (over 12 inches diameter) depending on the particular association of the locality.

437. The deciduous forests of the Attapadi valley are of good quality and contain tall well-grown trees of *Dalbergia latifolia*, *Lagerstrœmia lanceolata*, *Terminalia paniculata* and *Bischofia javanica* and young poles of *Artocarpus hirsuta*. The *Dalbergia* is particularly well grown and of large dimensions. Some teak and *Pterocarpus marsupium* also occur.

The deciduous forest in the Kalladikode Valley is also of good quality, the chief species found being :—*Xylia xylocarpa*, *Terminalia paniculata* and *Terminalia tomentosa*, *Artocarpus hirsuta* and the bamboo.

The Panakadan reserve supports a poorer type of deciduous forest consisting of *Xylia xylocarpa*, *Terminalia tomentosa* and *Terminalia paniculata*, *Dalbergia latifolia*, *Lagerstrœmia lanceolata*, *Artocarpus hirsuta*, *Pterocarpus marsupium*, and other species of similar associations.

SECTION 2.—DIVISION OF THE AREA.

438. The total area of the working circle is 34,992 acres distributed as shown in paragraph 426 above. Of these, the Silent Valley, Attapadi Blocks I and III and Panakadan reserves are in Mannarghat range. Chenat Nair is in the Palghat range, and Attapadi Block VI and Bolampatty Block II are in Bolampatty range. It is proposed to transfer Attapadi Block VI to Palghat range for administrative convenience ; proposals will be found in Chapter IX.

439. In order to facilitate enumeration and description of the growing stock, and the formation of coupes to give equal annual yields, each of the reserves mentioned above has been divided into compartments. The compartments vary in extent from about 200 acres to about 1,000 acres, and are for the most part bounded by natural features. When the enumeration and stockmapping of a compartment exhibited two different sub-types of forest within it, the compartment has been sub-divided, the subcompartment bearing the number of the compartment with a suffix ; in such cases the common boundary follows a more or less definite contour.

440. The gross and net areas of the compartments and their location are given below—the gross areas include grassy blanks and rocks, but these have been excluded from the net area.

Reserve.	Number of compartment or sub-compartment.	Gross area in acres.	Net area in acres (excluding blanks).	Remarks.
	A. SILENT VALLEY SERIES.			
1 Silent Valley reserve	1	365	265	
	2	965	642	
	3	784	402	
	4	774	627	
	4 a	202	146	
	5	869	661	
	6	867	618	
	7	315	315	Not enumerated.
	8	779	779	
	9	869	869	
	10	560	560	Enumerated together.
	10 a	240	240	
	11	524	286	Do.
	11 a	454	454	
	12	660	417	Do.
	12 a	513	513	
	13	425	285	
	14	1,080	806	Enumerated together.
	14 a	406	406	
2 Attapadi Block I	15	755	618	
	16	1,064	971	
	17	427	427	
	18	866	542	Deciduous.
	19	769	715	
	20	306	306	Semi-deciduous.

Reserve.	Number of compartment or sub-compartment.	Gross area in acres.	Net area in acres (excluding blanks).	Remarks.
	A. Silent Valley Series—*cont.*			
2 Attapadi Block I—*cont.*	21	906	906	Deciduous.
	22	431	431	Do.
3 Attapadi Block III	23	519	519	Deciduous.
4 Panakadan	24	1,106	958	Do.
	B. Attapadi Series.			
1 Attapadi Block VI	1	364	355	
	2	468	468	
	3	349	349	
	4	376	376	
	5	290	290	
	6	298	298	} Enumerated together.
	6 a	158	158	
	7	401	401	
	8	379	364	
	9	580	417	
	10	281	219	
	11	503	443	
	12	521	521	
	13	336	336	
	14	275	275	
	15	432	405	
	16	506	506	
	17	466	466	
	18	560	507	
	19	479	479	
	20	804	804	
	21	302	302	
	22	418	418	
2 Bolampatty Block II	23	450	450	
	23 a	528	510	
	24	198	194	
	24 a	267	267	
	25	814	723	
	25 a	256	200	
	26	214	214	
3 Chenat Nair Reserve	27	338	338	
	28	391	391	Not enumerated.
	28 a	200	200	
	29	894	894	Not enumerated.
	30	1,240	1,143	Do.
	31	856	838	Not enumerated. Deciduous.

NOTE.—The compartments are indicated by arabic numerals, one set of running numbers being allotted to each series. Each compartment or sub-compartment has been enumerated separately, with the exceptions indicated.

SECTION 3.—ANALYSIS AND VALUATION OF THE CROP.

441. The area included in this working circle has been divided into compartments with natural boundaries, as mentioned above, and a 50 per cent enumeration of the merchantable species in each compartment has been made, in 4-inch diameter classes, down to a breast height diameter of one foot.

The chief species enumerated in the sholas are :—*Mesua ferrea, Palaquium ellipticum, Calophyllum elatum* and *Calophyllum tomentosum, Artocarpus integrifolia* and *Artocarpus hirsuta, Hopea glabra, Dysoxylum malabaricum, Acrocarpus fraxinifolius, Vateria macrocarpa, Cullenia excelsa, Bischofia javanica, Eugenia sp., Nephelium longana* and *Poeciloneuron indicum.*

In the deciduous forests, the following species have been enumerated :—*Tectona grandis, Dalbergia latifolia, Terminalia tomentosa* and *Terminalia paniculata, Lagerstroemia lanceolata, Grewia tiliaefolia, Artocarpus integrifolia* and *Artocarpus hirsuta, Pterocarpus marsupium, Bischofia javanica, Albizzia sp.,* and *Xylia xylocarpa.*

442. The details of the method of enumeration adopted have been dealt with in Chapter VI (Part I).

An area of 2,722 acres of deciduous forest, in Attapadi Blocks I and III, was completely enumerated in order to arrive at a correct estimate of the quantity of *Dalbergia latifolia* of large dimensions that it contains, as the question of a road leading up to it had to be decided with reference to the value of this timber on the area.

During the enumeration apparently sound trees have been distinguished from trees partly unsound.

Statements showing the result of enumeration over each compartment will be found in Chapter VI (Part 1).

443. An analysis of the figures has revealed that, in the Silent Valley felling series, first quality *Mesua* trees of and above 12 inches in diameter at breast height, are distributed at an average rate of 2·8 trees per acre ; trees of and above a breast height girth of 7′ 6″

occur at the rate of 0·66 per acre. Second quality *Mesua* of and above 12″ in diameter occurs at the rate of 6·3 trees per acre ; trees of and above 6′ 6″ girth occur at the rate of 1·9 per acre.

In the Attapadi felling series there are 3·5 trees of first quality *Mesua*, of and above 12 inches in diameter, and 0·65 trees of and above 7′ 6″ in girth, per acre ; and there are 7·1 trees of second quality *Mesua*, of and above 12 inches in diameter and 1·4 trees of and above 6′ 6″ girth, per acre.

444. The following table shows the total number of trees of the more prevalent species distributed in diameter classes, over the area of the two felling series, on the basis of the 50 per cent enumeration carried out. (Actual figures have been doubled.)

Total number ot trees of the important species enumerated in the selection working circle (based on a 50 percent enumeration).

Species.	Diameter class.								
	12″–16″.	16″–20″.	20″–24″.	24″–28″.	28″–32″.	32″–36″.	36″–40″.	Above 40″.	Total.
				SILENT VALLEY SERIES.					
Mesua ferrea	12,978	12,599	11,522	8,317	5,148	2,576	1,381	1,980	56,501
Palaquium ellipticum	28,874	21,233	13,307	5,821	2,638	912	368	413	73,566
Calophyllum elatum	2,940	2,901	2,463	1,825	1,234	754	443	745	13,305
Cullenia excelsa	3,544	4,729	5,062	3,992	2,979	1,546	1,142	3,395	26,399
Poeciloneuron indicum	16,987	13,277	11,087	6,745	3,696	1,328	712	1,418	55,250
				ATTAPADI SERIES.					
Mesua ferrea	14,930	12,848	11,572	7,458	4,466	2,020	924	1,442	55,660
Palaquium ellipticum	37,696	24,740	16,750	6,358	2,832	964	352	380	90,072
Calophyllum elatum	5,252	4,220	3,326	2,150	1,382	860	518	716	18 424
Cullenia excelsa	19,752	16,180	19,122	8,700	5,476	2,928	1,672	5,458	79,288
Poeciloneuron indicum	786	554	472	154	84	14	8	34	2,106
Vateria macrocarpa	10,314	8,716	8,034	8,242	6,820	4,542	3,382	12,002	62,052

445. The table above shows that the proportion of comparatively valueless species like *Cullenia excelsa, Vateria macrocarpa, Poeciloneuron indicum* and *Palaquium ellipticum* is considerably higher than that of *Mesua*, in all diameter classes, but particularly in the smaller ones.

446. The enumerations have been of great help in recognizing sub-types within the main rain-forest type ; the following associations have been distinguished on the stock-maps :—

1 The *Cullenia-Palaquium* association,
2 the *Palaquium-Mesua* association,
3 the *Poeciloneuron-Palaquium* association,
4 the *Mesua-Calophyllum* association,
5 the *Cullenia-Mesua* association,
6 the *Vateria-Cullenia* association,
7 the *Reed-Calophyllum* association, and
8 the *Reed-Poeciloneuron* association.

447. The subjoined table exhibits the allotment of compartments to the different associations :—

Association.	Compartments belonging to the association.					
	Silent Valley series.	Area in acres.		Attapadi series.	Area in acres.	
		Gross.	Net (excluding blanks).		Gross.	Net (excluding blanks).
1 *Cullenia-Palaquium.*	1, 2, 13, 14, 15, 16.	4,655	3,587	1 to 6, 6 a, 7 to 17, 28, 28 a, 29, 30.	9,708	9,275
2 *Palaquium-Mesua* ..	3, 4, 4 a, 5, 11, 12.	3,813	2,539	Nil	..	..
3 *Poeciloneuron-Palaquium.*	6, 8, 9, 10 ..	3,075	2,826	Nil	..	..
4 *Mesua-Calophyllum.*	10 a, 11 a, 12 a, 14 a.	1,613	1,613	23, 23 a, 24, 24 a, 25, 25 a, 26.	2,727	2,558
5 *Cullenia-Mesua* ..	17, 19	1,196	1,142	21, 22, 27 ..	1,058	1,058
6 *Vateria-Cullenia* ..	..	..	..	18, 19, 20 ..	2,030	1,790
7 *Reed-Calophyllum* ..	Parts of 4, 4 a, and 5.	..	..	Nil	..	..
8 *Reed-Poeciloneuron.*	7	315	315	Nil.	..	..

448. The composition of each association and the main differences that distinguish one association from another have been fully discussed in Section I (*b*) of Chapter II (Part I).

449. In the deciduous forests, the most important species found over a particular locality have been indicated on the maps by suitable letters.

450. The distribution of diameter classes in different associations for *Mesua* and *Palaquium* will be found in Chapter II (Part I).

SECTION 4.—METHOD OF TREATMENT.

(a) *Silvicultural system.*

451. The special object of management is to exploit the sholas for merchantable timber—chiefly *Mesua ferrea, Palaquium ellipticum* and *Calophyllum elatum*—in such a manner that their essentially ever-green character is not endangered, and to treat them so as to improve the proportion of merchantable species they contain. Such of the deciduous forests, as are not suited for clear felling and planting, will be worked on similar lines, so as to increase the value of the growing stock in quality and quantity. The species that are suitable for extraction from these are: Teak, *Dalbergia latifolia, Xylia xylocarpa, Terminalia tomentosa* and *Terminalia paniculata, Lagerstrœmia lanceolata* and *Pterocarpus marsupium.*

Present knowledge as to the rates of growth of the merchantable species in the rain forest and of the successful methods of regenerating them, being very meagre, it is proposed to extract what is considered over-mature and moribund, or deteriorating, by light selection fellings, as quickly as possible, with a safe girth limit calculated for an equal annual sustained yield.

Of the gaps created by fellings, those which do not contain a sufficiency of natural seedlings of the valuable species, and are sufficiently large for regenerating, will be artificially regenerated.

The method of treatment proposed is thus a modified selection system, followed by the artificial regeneration of such of the gaps created by fellings as are above a minimum size but do not contain sufficient natural regeneration of the valuable species.

(b) *Quality classes.*

452. *Mesua ferrea.*—Two distinct quality classes for *Mesua* have been recognized, the first quality found in associations below, approximately, 3,750 feet and the second one, in those above this elevation. The second quality is distinctly poorer, in height and girth, than the first.

453. *Dalbergia latifolia.*—The *Dalbergia* in the Attapadi valley will be taken to be equal to the first quality *Mesua,* but in Panakadan to be equal to the second quality, for purposes of volume calculation.

454. *Teak, Pterocarpus marsupium* and *Xylia xylocarpa.*—These are poor in height growth and will therefore be allotted to the second quality, for purposes of volume calculation.

(c) *Exploitable girth.*

455. The minimum exploitable girth for each species has to be fixed with reference to quality, the percentage of hollow trees in the higher girth classes, the girth above which annual increment begins to fall off, the quantity of overmature stock on the ground, the felling cycle, the capacity of the market to absorb the output without being glutted, the possibility of extracting the whole of the prescribed annual yield, and the possibility of providing for a sustained annual yield. Since *Mesua ferrea* is the most widely prevalent species occuring in the area, the girth limit will be fixed for that species primarily. As two quality classes have been recognized, minimum girths have to be fixed for both.

456. The annual yield will be fixed with reference to *Mesua ferrea, Dalbergia latifolia, Tectona grandis, Pterocarpus marsupium* and *Xylia xylocarpa,* as all these species can be profitably exploited from anywhere within the working circle.

457. *First quality.*—The percentage of hollow trees is in excess of 33 for *Mesua* over a breast height girth of 10 feet (vide paragraph 124) and the gross volume curve falls off rapidly above this girth; the exploitable girth is therefore well below this limit.

The poor incidence of this species among smaller diameter classes shows that regeneration is under a heavy handicap. A sustained annual yield of *Mesua,* equal to the yield now obtainable on account of overmature timber, cannot be made available, for ever, under such abnornal conditions. An attempt, will be made, however, to ensure that the mature and overmature trees are exploited in two felling cycles of approximately equal yield.

In the absence of local increment figures, Troup's figures for *Mesua ferrea* in the Nambor forests of Assam will be used as a basis for calculation. A girth increment of 6 inches in ten years may be expected for trees 4 feet 6 inches in girth, in Assam, according to Troup; but since we are concerned with two quality classes of *Mesua,* and trees of 6 feet in girth, the expectation of a lower general increment would be more appropriate, especially when the second quality trees are more in number than those of the first quality. An increment of 6 inches in 15 years will therefore be assumed, for *both* quality classes of *Mesua ferrea.*

The minimum girth will be fixed at a high limit during the current felling cycle, and it will also be assumed that it will be lowered in the next; this is necessary to distribute the yield from overmature trees more or less equally over the first two felling cycles.

Assuming a minimum exploitable girth of 7 feet 6 inches at breast height for the current felling cycle, enumeration shows that there are 9,039 trees of first quality, of and above this girth, on the balance of the area which remains to be felled in the current felling cycle. If the minimum girth be lowered to 6 feet 6 inches in the next felling cycle, trees 6 feet in girth now will be above this minimum girth in the next cycle, as they may be expected to have grown 6 inches during that period. The number of trees now on the ground between 6 feet and 7 feet 6 inches is 10,287, and therefore we may expect a slightly higher yield in the next cycle than in the current one, from this quality class.

458. *Second quality.*—This quality of *Mesua* occupies comparatively remote localities above an elevation of 3,750 feet, from which the extraction of metre-gauge sleepers is not ordinarily profitable. It is hardly economical to make broad-gauge sleepers from trees below 6 feet in girth, so that this minimum cannot be lowered, normally. For the first felling cycle, a slightly higher minimum will be fixed, which will be lowered in the next cycle for reasons already discussed above.

Assuming a minimum girth of 6 feet 6 inches (for all species except *Xylia xylocarpa* for which a minimum of 6 feet will be adopted) there are 14,034 trees, of and above this girth, on the ground (above 6 feet for *Xylia*). If the girth limit be lowered to 6 feet in the next cycle (and to 5 feet for *Xylia*) trees 5 feet 6 inches in girth now (4 feet 6 inches for *Xylia*) may be expected to grow into exploitable size before the next felling, assuming the same girth increment as before. There are 10,285 trees on the ground now, between 5 feet 6 inches and 6 feet 6 inches (*Mesua*, *Dalbergia*, teak, and *Pterocarpus marsupium*) and 1,904 trees of *Xylia* between 4 feet 6 inches and 6 feet—or a total of 12,189 trees and these will be above the minimum exploitable size in the next felling cycle.

459. *Net results.*—There would thus be an excess of 1,248 trees in first quality but a deficit of 1,845 trees in the second quality, in the second felling cycle, over the corresponding numbers in the first. The net deficit in the second cycle, assuming a second quality tree to yield three-fourths as much as a first quality one, would be 180 trees which is negligible when probable errors in calculation and statistics are taken into consideration.

460. The trees in the second felling cycle will be of a smaller average girth, but more sound, and a larger percentage of the stand will be available for felling as the percentage of hollow trees will also be smaller. At present, about 66 per cent of the stand above the exploitable girth is available for felling. If the girth increment, as indicated by the measurement of sample trees already selected for the purpose, be found to be higher than what has been assumed, the minimum girth in the second felling cycle might be kept at a higher figure—say 7 feet—and the drop in yield in the third felling cycle, inevitable as conditions are at present, considerably mitigated.

461. *Third, fourth and fifth felling cycles.*—It will be interesting to see what the position is likely to be in the third and subsequent felling cycles. It has been mentioned already that a drop is inevitable on account of the fact that at present there is a lot of overmature timber in the forest and on account of the deficiency of trees in the lower diameter classes. It will be assumed that trees of all sizes will grow 6 inches in girth in 15 years; on this basis, the number of trees that are likely to be above the minimum exploitable girth in the working circle, for the first five felling cycles, not allowing for any mortality, will be :—

Felling cycles.	Number of exploitable trees expected to be on the ground.	
	First quality.	Second quality.
First felling cycle	9,029	14,034
Second felling cycle	10,287	12,189
Third felling cycle	5,006	7,886
Fourth felling cycle	5,299	8,069
Fifth felling cycle	5,124	7,797

Note.—*Xylia* will have a minimum girth limit of 6 feet in the first felling cycle and of 5 feet in the subsequent cycles.

It may be observed that no appreciable mortality per cent was noticed during the course of enumeration.

It will also be noticed that the figures indicate the possibility of a sustained annual yield of 53 per cent of the average yield in the first and second felling cycles for first quality and of 60 per cent of that for the second quality. With a higher percentage of trees which are likely to be available for future fellings on account of a reduction in the percentage of hollow trees, a sustained annual yield of 60 per cent of the average for the first two felling cycles may be expected in the succeeding ones. Owing to the fact that several coupes have already been felled over, the results may turn out to be slightly different to the calculations.

462. For the reasons discussed above, the following minima are prescribed for the exploitable girths of the undermentioned species and qualities, for the first felling cycle, and are suggested for the second felling cycle.

	First felling cycle.	Second felling cycle.
Mesua ferrea— First quality	7′ 6″	6′ 6″
Dalbergia latifolia	7′ 6″	6′ 6″
Teak	7′ 6′	6′ 6″
Pterocarpus marsupium	7′ 6″	6′ 6″
Mesua ferrea— Second quality	6′ 6″	6′
Xylia xylocarpa— (Panakadan)	6′	5′

For the sake of uniformity, and in order to provide against an appreciable drop in the yield for the second felling cycle, as a result of the wholesale harvesting of overmature trees in the first, the minima for *Palaquium ellipticum*, *Calophyllum elatum* and all other saleable species, will also be fixed at 7 feet 6 inches for the first felling cycle. The limited demand that kolmarams and chattams (the only form in which *Palaquium* and *Calophyllum* find a sale) have in the timber market at present makes it difficult for us to exploit these species economically except from the most accessible localities. A girth limit of 7 feet 6 inches is not likely, therefore, to lock up trees which can be sold now at a profit. This limit may, it is suggested, be lowered to 6 feet 6 inches, in the next felling cycle.

(*d*) *Felling series.*

463. Two felling series are constituted, the Silent Valley Felling series, 18,800 acres in extent and the Attapadi Felling series 16,192 acres in extent. The Silent Valley Felling series comprises parts of—

	ACRES.
The Silent Valley reserve	11,651
Attapadi Block I reserve	5,524
Attapadi Block III	519
The Panakadan Reserve	1,106
Total	**18,800**

The Attapadi Felling series comprises parts of—

Attapadi Block VI reserve	9,546
Chenat Nair reserve (part)	3,919
Bolampatty Block II (part)	2,727
Total	**16,192**

The Silent Valley Felling series lies entirely in the Mannarghat Range, while the Attapadi series is mainly in the proposed Palghat Range, and partly in the Bolampatty Range.

(*e*) *The Felling cycle.*

464. It is desirable that the moribund or deteriorating overmature trees of ***Mesua ferrea*** should be extracted as quickly as possible. But at the same time, too short a felling cycle would result in so high a yield in the first period that there would be a sudden drop in yield in the second, since there would not be sufficient time for an appreciable number of trees of the lower diameter classes to pass into the minimum exploitable diameter class. The selection of proper minimum exploitable girths so as to ensure a distribution of the abnormally high yield (due to overmature trees) over two felling cycles has been discussed

in the previous sub-section and the correct girths have been prescribed. It will also be seen from that sub-section that a girth increment of 6 inches in 15 years may safely be assumed for the purpose of these calculations. A felling cycle shorter than fifteen years is therefore likely to upset the possibility of the sustained annual yield indicated above. It will also result in yielding so large a number of sleepers per year in the first period, that the available labour is not likely to manage to drag them all down within the year.

A felling cycle of fifteen years is therefore prescribed for the first period for the Silent Valley felling series.

Fellings on the lines prescribed in this plan commenced in the Silent Valley series in the year 1928–29 so that five years will have elapsed by the end of the current year 1932–33. There will thus be a balance of ten years in the first felling cycle.

In the Attapadi felling series, the fellings commenced in the year 1930–31. It is desirable that the final coupes in the two felling series should be worked in the same year, so that the second felling cycle may be started at the same time in both, when this plan comes up for revision. The first felling cycle for the Attapadi series is therefore fixed at thirteen years, and as three coupes will have been already worked by the end of the current year 1932–33, here again there will be a balance of ten years in the first felling cycle. This will give an average annual yield of sleepers of about 16,000 broad gauge units from both the felling series together.

When the plan comes up for revision, statistics of the rates of growth of the important species will be available, from the prescribed tree increment plots, in the light of which the felling cycle can be fixed on a more scientific basis.

(*f*) *Calculation and Regulation of the yield.*

Summarise.

465. The species for which there is an assured demand for our full output are *Mesua ferrea* (for railway sleepers) among the shola trees and teak, *Dalbergia latifolia, Pterocarpus marsupium* and *Xylia xylocarpa,* among the deciduous. All these species can be profitably extracted from anywhere in the working circle.

The major part of the area in the working circle being shola, the yield will be regulated so as to obtain an approximately equal annual output of railway sleepers, during the remainder of the present felling cycle, from the total number of exploitable trees, in the two quality classes, at present on the ground. No allowance will be made for any increment during the felling cycle amongst these trees as many of them are already moribund or deteriorating.

466. The number of trees of and above the minimum exploitable girth, existing in a compartment, is worked out in diamater-classes, from the enumeration data. The number of these trees in each diameter class that is likely to be available for felling (others being excluded on account of excessive hollowness or the restrictions imposed by the marking rules) is then arrived at by applying the percentages worked out in the statement for *Mesua ferrea* given in paragraph 403 of Chapter VI of Part I. The distribution of the number of such trees above a breast height diameter of 40 inches is obtained from the percentages worked out in the statement in paragraph 404 of the same chapter. Having thus obtained the number of trees in each diameter class that is likely to be available for felling from a compartment, the gross and net outturn for each diameter class are worked but by applying the average volume table for *Mesua ferrea,* given in paragraph 395 of Chapter VI, Part I, for all first quality *Mesua*. First quality *Dalbergia latifolia* (of which we have only a small number) will be considered to yield the same outturn.

467. The outturn from second quality *Mesua* has been *estimated* at three-fourths of that from the first quality. Teak, *Pterocarpus marsupium,* and second quality *Dalbergia* will be taken as equivalent to second quality *Mesua ;* they constitute a small number, so that small differences are not likely to affect the results appreciably.

The outturn from *Xylia xylocarpa* was calculated by applying the values from the tabular statement for that species given in Chapter VI (Part I).

468. The net outturn from *Mesua ferrea* and teak has also been converted to units of broad gauge sleepers, the percentage of rejection by the sleeper-passing-officer allowed for, and the net number of passed broad gauge sleeper units from each coupe tabulated in the last column. If *Dalbergia latifolia* cannot be extracted in a more profitable shape, it may also be sawn into sleepers.

469. The yield from species other than those mentioned above, has been expressed as the number of trees above the exploitable girth existing in the coupe, in different diameter classes. It is unlikely that these species will be extracted from many of the coupes during the current felling cycle.

The outturn from *Palaquium ellipticum* may be arrived at, when necessary, by applying the proper volume table given in Chapter VI (Part I).

470. From the part of Compartment 11 (*a*) included in Coupe IX of the Silent Valley series, more than three trees, above the minimum exploitable girth, are available for felling per acre. But the yield has been calculated on the assumption that no more than three trees per acre will be felled—vide Rule 6 of the ' marking rules ' in paragraph 479.

471. The gross average annual yield from the Silent Valley series is 54,315 cubic feet; the growing stock above 12 inches in diameter is 19·29 lakhs of cubic feet; the anticipated yield is therefore 2·8 per cent of the growing stock. The gross average annual yield from the Attapadi series is 55,815 cubic feet, the growing stock above 12 inches in diameter is 23·95 lakhs of cubic feet, so that the anticipated yield is 2·3 per cent of the growing stock.

After the overmature stock has been exploited in the first two felling cycles, a drop of 40 per cent in the yield has been anticipated in paragraph 461 above.

(*g*) *Coupes.*

472. The coupes have been so constituted as to have natural features or roads and reserve lines as boundaries.

They are not of equal extent but are approximately equiproductive with reference to the yield of railway sleepers.

473. The coupes will be felled in the order shown in the subjoined statements, which give the year of felling, compartments constituting the coupe, the net area of the coupe, the net outturn of broad gauge sleeper units that may be expected, and the number of trees above exploitable size, of species other than *Mesua*, which exist on the ground and which may be felled, subject to the marking rules, if and when markets are found for them.

474. Coupe III of the Attapadi series is under felling for sleepers in 1932–33, but coupe II is under felling for kolmarams and chattams. Both coupes should be regenerated together in 1933–34.

No coupe or part of a coupe should be felled over more than once in the same felling cycle; if fellings cannot be executed for sleepers and (or) kolmarams over a particular coupe or part of a coupe in any one year, owing to lack of demand, the worked portion of the coupe must lie over for exploitation till it is due for felling in the next felling cycle. Any unworked balance may, of course, be exploited in the succeeding year.

Tabular statement of yield of railway sleepers from the coupes of the Silent Valley felling series.

Coupe and compartment.		Area in acres.		Name of species.	Number of trees above exploitable girth.			Probable number of trees available for felling.			Yield.				Remarks
Coupe number.	Compartment number.	Gross.	Net (deducting blanks).		First quality.	Second quality.	Total.	First quality.	Second quality.	Total.	Gross cubic feet.	Net cubic feet.	Broad gauge units.	Passed units	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
VI ..	.. 17	427	427	*Mesua ferrea*	..	1,453	1,453	..	928	928	62,387	29,360	9,395	8,925	
VII	.. 8, 9 and 24 ..	2,754	2,606	Do.	518	..	..	328	..	..	..	..	..	..	40,000 cubic feet of deciduous timber also.
				Xylia xylocarpa	..	662	1,193	..	437	773	57,479	25,075	8,024	7,567	
				Teak	..	6			4						
				Dalbergia latifolia	..	7			4						
VIII	.. 10, 10-a, part, north	668	668	*Mesua ferrea*	641	391	1,032	408	250	658	59,803	25,757	8,242	7,830	45 per cent of the stand of 10-aa has been taken for 10-a north, 55 per cent for 10-a south; felling restricted to three trees per acre in 11-a north though more are available.
IX ..	.. 11-N and 11-a N and 10-a part, south.	592	497	Do.	86	1,351	1,437	54	861	915	60,729	28,581	9,145	8,687	
X ..	.. 11-S and 11-a S ..	518	375	Do.	87	1,280	1,367	55	822	877	61,287	28,740	9,200	8,740	
XI ..	.. 12, 12-a	1,173	930	Do.	240	1,053	1,293	152	673	825	58,648	27,541	8,814	8,373	
XII	.. 13, 14-a	831	691	Do.	365	1,170	1,535	233	743	976	71,820	33,809	10,819	10,278	
XIII	.. 14	1,080	806	Do.	1,002	..	1,002	636	..	636	65,907	31,077	9,945	9,448	
XIV	.. 19	769	715	Do.	..	1,193	1,193	..	756	756	46,977	22,103	7,073	6,719	2,000 Kolmar amsalso.
XV	.. 16 part, 18, 20 21, 22 and 23.	3,346	3,008	*Mesua ferrea*	271	55	962	173	34	613	57,904	27,268	8,726	8,290	5,000 Do.
				Dalbergia latifolia	310	..		197	..						
				Teak	..	95	..	..	64						
				Pterocarpus marsupium ..	..	231	..	..	145						

Tabular statement of yield of railway sleepers from the coupes of the Attapadi series.

Coupe number.	Compartment number.	Gross.	Net (deducting blanks).	Name of species.	First quality.	Second quality.	Total.	First quality.	Second quality.	Total.	Gross cubic feet.	Net cubic feet.	Broad gauge units.	Passed units	Remarks
				Mesua ferrea	107	1,083	1,190	68		753	49,284	23,204	7,425	7,054	10,000 Kolmarams also.
IV ..	.. 27 and 5	628	628	Do.	849	..	849	536	685	536	55,543	25,705	8,226	7,815	Do.
V ..	.. 2, 3, 4 and 6-a ..	1,351	1,351	Do.	1,011	..	1,011	640	..	640	66,077	31,151	9,968	9,469	
VI ..	.. 6, 7, 8 and 14 ..	1,353	1,338	Do·	881	..	881	559	..	559	58,104	27,404	8,796	8,331	5,000 Kolmarams also
VII ..	.. 15 and 16 ..	938	911	Do.		1,395	1,395	..	..	887	56,485	26,519	8,486	8,062	7,000 Do.
IX ..	.. 22	418	418	Do.		1,359	1,359	..	887	358	52, 31	24,452	7,825	7,434	10,000 Do.
X ..	.. 24, 24-a, 25. 25-a, 26 and 1	978	960	Do·	214	700	914	185	858	576	41,110	19,529	6,249	5,937	
		2,113							441						
XI ..	.. 13 and 17	802	802	Do.	854	..	854	542	..	542	56,596	26,702	8,545	8,118	
XII ..	.. 9, 10, 11, 12 and 21 ..	2,187	1,902	Do.	654	515	1,169	416	349	765	64,667	30,600	9,745	9,302	
XIII	.. 18, 19 and 20 ..	1,843	1,790	Do.	948	..	948	569	..	596	58,251	27,357	8,754	8,316	

Statement of merchantable trees available above exploitable girth other than sleeper wood.

Name of series.	Coupe number.	Compartment number.	Area in acres.		Name of species.	Trees available above exploitable girth			Above 40.	Total.	Remarks.
			Gross.	Net.		28·6532".	32 ·36.	36"–40.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Silent Valley ..	VI	.. 17	427	427	*Palaquium ellipticum*	28	8	2	10	48	
					Calophyllum elatum	48	46	16	32	142	
					Hopea species	30	2	2	10	44	
					Acrocarpus fraxinifolius	2	..	..	8	10	
					Dysoxylum malabaricum	2	..	..	..	2	
	VII	.. 8, 9 and 24	2,754	2,606	*Palaquium ellipticum*	300	106	22	22	450	40,000 cubic feet of logs of *Terminalia* and *Lagerstrœmia* may be sold from this coupe.
					Calophyllum elatum	135	108	94	132	469	
					Poeciloneuron indicum	1,990	908	490	1,030	4,418	
					Hopea glabra	..	4	..	2	6	
					Terminalia tomentosa	17	16	6	4	43	
					Terminalia paniculata	183	142	72	178	575	
					Lagerstroemia lanceolata	75	50	32	24	181	
	VIII	.. 10, 10-a, part north of stream.	668	668	*Palaquium ellipticum*	169	59	18	12	258	
					Calophyllum elatum	60	38	22	36	156	
					Pœciloneuron indicum	456	202	104	182	944	
					Hopea sp.	..	..	2	2	4	
					Dysoxylum malabaricum	2	4	..	..	6	
	IX	.. Part of 10-a, south of stream. 11-N and 11 a.N.	592	497	*Palaquium ellipticum*	40	7	..	2	49	
					Calophyllum elatum	83	63	35	57	238	
					Pœciloneuron indicum	46	12	10	12	80	
					Dysoxylum malabaricum	..	..	1	1	2	
	X	.. 11-S and 11 a. S. ..	518	375	*Palaquium ellipticum*	37	12	2	2	53	
					Calophyllum elatum	66	51	19	39	175	
					Pœciloneuron indicum	24	16	..	16	56	
	XI ..	.. 12 and 12-a	1,173	930	*Palaquium ellipticum*	98	52	8	14	172	
					Calophyllum elatum	77	38	38	42	195	
					Pœciloneuron indicum	7	10	..	2	19	
					Hopea sp.	47	24	2	20	93	
					Acrocarpus fraxinifolius	8	8	2	1	17	
					Dysoxylum malabaricum ..	1	2	2	4	9	
	XII ..	.. 13 and 14-a	831	691	*Palaquium ellipticum*	170	63	55	16	304	
					Calophyllum elatum	112	63	38	63	276	
					Hopea sp.	101	53	31	49	234	
					Acrocarpus fraxinifolius	1	..	..	..	1	
					Dysoxylum malabaricum	..	..	2	..	2	
	XIII	.. 14	1,080	806	*Palaquium ellipticum*	244	107	41	52	444	
					Calophyllum elatum	44	31	16	31	122	
					Hopea sp.	95	53	45	63	256	
					Dysoxylum malabaricum	5	6	2	..	13	
	XIV..	.. 19	769	715	*Palaquium ellipticum*	50	24	10	12	96	
					Calophyllum elatum	52	26	20	22	120	
					Acrocarpus fraxinifolius	8	8	6	92	114	2,000 kolmaram units may be sold.
					Lagerstrœmia lanceolata	3	..	..	..	3	
	XV ..	.. 16, 18, 20, 21, 22 and 23.	3,346	3,008	*Palaquium ellipticum*	496	266	110	188	1,060	
					Calophyllum elatum	66	66	38	146	316	
					Hopea sp.	54	14	16	16	100	5,000 kolmaram units may be sold.
					Acrocarpus fraxinifolius	31	28	42	102	203	
					Dysoxylum malabaricum	5	8	2	6	21	
					Terminalia tomentosa	2	2	2	4	10	
					Terminalia paniculata	59	34	12	56	161	
					Lagerstrœmia lanceolata	369	256	104	182	911	
Attapadi ..	.. IV ..	.. 27 and 5	628	628	*Palaquium ellipticum*	305	134	44	50	533	10,000 kolmaram units may be sold from this coupe.
					Calophyllum elatum	88	66	40	24	218	
					Pœciloneuron indicum	3	..	2	4	9	
	V ..	.. 2, 3, 4 and 6-a ..	1,351	1,351	*Palaquium ellipticum*	288	122	46	48	504	Do.
					Calophyllum elatum	58	62	34	76	230	
					Pœciloneuron indicum	42	6	2	16	66	
					Dysoxylum malabaricum	8	2	..	4	14	
	VI ..	.. 6, 7, 8 and 14.. ..	1,353	1,338	*Palaquium ellipticum*	423	142	34	46	645	
					Calophyllum elatum	48	46	28	58	180	
					Pœciloneuron indicum	13	4	..	2	19	
					Hopea sp.	2	..	..	2	4	
					Dysoxylum malabaricum	4	..	..	2	6	
	VII ..	.. 15 and 16	938	911	*Palaquium ellipticum*	160	32	20	12	224	
					Calophyllum elatum	59	58	30	42	189	
					Acrocarpus fraxinifolius	2	..	..	..	2	
	VIII	.. 22	418	418	*Palaquium ellipticum*	133	46	22	12	213	5,000 kolmaram units may be sold from this coupe.
					Calophyllum latum	50	19	12	20	101	
					Acrocarpus fraxinifolius	..	..	..	2	2	
	IX ..	.. 23 and 23-a	978	960	*Palaquium ellipticum*	11	4	2	..	17	7,000 kolmaram units may be sold from this coupe.
					Calophyllum elatum	280	194	114	104	692	
					Acrocarpus fraxinifolius	5	4	..	4	13	
	X ..	.. 24, 24-a, 25, 25-a 26 and 1.	2,113	1,953	*Palaquium ellipticum*	35	10	..	4	49	
					Calophyllum elatum	338	226	144	150	858	2,000 *Acrocarpus* kolmaram units and 8,000 of other species may be sold.
					Acrocarpus fraxinifolius	18	6	8	84	116	
					Dysoxylum malabaricum	..	..	2	18	20	
	XI ..	.. 13 and 17	802	802	*Palaquium ellipticum*	207	70	16	26	319	
					Calophyllum elatum	80	68	42	90	280	
					Pœciloneuron indicum	3	4	4	12	23	
					Hopea sp.	2	..	..	..	2	
					Dysoxylum malabaricum	7	6	4	..	17	
	XII ..	.. 9, 10, 11, 12 and 21 ..	2,187	1,902	*Palaquium ellipticum*	629	362	156	170	1,317	
					Calophyllum elatum	68	54	40	104	266	
					Pœciloneuron indicum	8	..	..	..	8	
					Acrocarpus fraxinifolius	..	..	2	..	2	
					Dysoxylum malabaricum	4	6	2	4	16	
	XIII	.. 18, 19 and 20 ..	1,843	1,790	*Palaquium ellipticum*	80	24	8	2	114	
					Calophyllum elatum	75	68	30	46	219	
					Dysoxylum malabaricum	4	2	..	2	8	

SECTION 5.—EXPLOITATION.

475. Experience in the Silent Valley shows that elephants do not seem to thrive in these sholas, either due to lack of suitable fodder or, possibly, to the dislike the mahouts have for the locality. Also, dragging coolies can do our work cheaper than elephants, on the whole. Extraction will therefore be by coolie-dragging, up to the heads of cart-tracks.

476. *Extraction map.*—An enlarged map of the coupe to be exploited will be prepared on squared paper divided into tenths of an inch, to a scale of 8 inches to the mile. It will be divided into a number of subdivisions by natural features, roads or paths, will have contour lines marked on it a hundred feet apart, and will be prepared before the commencement of marking. It may be known as the 'extraction map.'

477. *Extraction scheme.*—At the time of marking, an extraction scheme for the coupe will be prepared showing, on the extraction map, the forest depot sites to which the timber is proposed to be dragged, the drag-paths that may be necessary, and any graded paths up which the timber may have to be carried against the load. The inspection paths prescribed in paragraph 693 should be borne in mind when providing such paths ; and they are estimated, on past actuals, to cost about Rs. 50 a mile.

In coupes which are comparatively remote, it will be necessary to provide an intermediate depot to which the material will have to be dragged from stump-site. From this depot it will then be dragged down to the heads of cart-tracks.

478. The trees for extraction should be marked systematically and progressively, during the months of October to January, commencing from one end of the coupe.

479. *Marking rules.*—The following marking rules are prescribed for the guidance of the marking officer :—

(*a*) *Shola forests.*

1. Only sound and partly sound *Mesua* trees of 7 feet 6 inches girth at breast height and over in first quality areas and 6 feet 6 inches girth at breast height and over in second quality areas, shall be marked for felling.

2. Of all other merchantable species, like *Palaquium ellipticum, Calophyllum sp., Hopea glabra, Acrocarpus fraxinifolius,* sound and partly sound trees of and above 7 feet 6 inches girth at breast height, shall be marked.

3. An unsound tree which is not likely to yield sufficient outturn to make it worth while for a sawyer to fell and convert it, shall not be marked.

4. For the purpose of marking, *Mesua ferrea* shall take precedence over all other species : species like *Acrocarpus fraxinifolius, Hopea glabra* and *Dysoxylum malabaricum,* the kolmarams of which fetch a high price in the market, shall come next, after which *Palaquium ellipticum* and *Calophyllum sp.* may be marked.

5. No two marked trees shall be nearer than 60 feet from each other, unless they are in such a position that they can be felled so as to create one large gap in the canopy.

6. The total number of trees of all species marked over the whole coupe shall not exceed three per acre over the net area of the coupe : the group of two trees excepted under Rule 5 above, will be taken as one tree for the purpose of this rule.

7. The marking shall be completed by the end of January preceding the year of felling, which latter will be the financial year.

8. All climbers found attached to a marked tree, whether growing on it or not, shall be cut by the marking party simultaneously with the marking.

9. The trees shall be marked on the uphill side with a blaze, at a convenient height, so that the number of the tree which shall be engraved on it with a chisel, will remain on the stump after felling ; the height of the blaze will depend upon the buttresses on the tree, if any.

10. Each species will have its own consecutive numbers, beginning with unity.

11. In addition to its distinguishing number, the blaze shall be impressed with a marking hammer, bearing the year of marking, in addition to the usual marks on the District Forest Officer's property hammer, which should be returned to the District Forest Officer on the completion of the marking.

12. The marking will be done by an officer not below the rank of a forester, and he must be specially trained for the purpose.

13. The marking lists shall be prepared separately for each species and should show the measured girth at breast height of the tree in inches, and its estimated length of merchantable bole, to the nearest ten feet.

14. The tending referred to in paragraph 525 should be carried out at the time of marking.

(*b*) *Deciduous forests.*

15. All exploitable *Dalbergia latifolia*, Teak, *Pterocarpus marsupium*, *Xylia xylocarpa*, *Grewia tiliaefolia*, *Albizzia sp.*, *Terminalia tomentosa* and *Terminalia paniculata* and any other merchantable species, shall be marked for felling, if saleable at no loss to the department.

16. The minimum exploitable girth at breast height is fixed at 6 feet for *Xylia xylocarpa* and 7 feet 6 inches for all other species.

17. No two marked trees shall be nearer than 30 feet from each other, unless they are in such a position that they can be felled so as to create one large gap in the canopy.

(*c*) *General* (*Shola and deciduous forests*).

18. The marked trees should be located on the extraction map by their serial numbers, individually or in small groups, as may be practicable ; when more than one species is marked, a letter should be used to distinguish the species, in addition to the number.

19. At least 20 per cent of the marking should be checked and certified to by the Range officer, and at least 10 per cent by the District Forest Officer or his gazetted assistant.

480. *Felling, Conversion and Extraction.*—During the years 1928–31, all exploitation in the Silent Valley was by departmental agency : but from 1931, felling, conversion and extraction of marked trees has been done through a contractor. Exploitation by the agency of contractors should be encouraged and extended as far as practicable, in so far as it is compatible with the interests of the department ; the advantages of the method need little advocacy.

Felling should commence at one end of the coupe and progress systematically towards the other end. As far as possible trees should be felled uphill, in order to minimize damage due to fall, and the cut should be as low as possible. Damage to valuable standing trees and to advance-growth and poles of valuable species in the vicinity should also be duly considered before deciding the direction of fall.

Any unmarked tree unavoidably broken in the course of felling, should be converted if it is saleable. Any valuable regeneration entangled in the fallen crown should be promptly freed, and all damaged seedlings should be cut back.

The felled tree will be logged by the sawyers who are usually good at this work, but the forester in charge of fellings will be held responsible for seeing that logging is properly and economically conducted and that there is no avoidable waste.

The logs are usually sawn at stump-site on a platform made of poles cut from the vicinity. The felling of poles of valuable species for the construction of these platforms should be strictly prohibited, unless they have been damaged by the fall of the marked tree. Further, unwanted poles, standing in and round the periphery of a gap, should be used for this purpose in preference to others outside the gap, as the clearing and enlargement of a gap will assist subsequent artificial regeneration.

The utilizable logs will be measured and brought to stock by the forester in charge of felling, in accordance with current practice.

481. Sleepers, kolmarams and chattams must be sawn to the following sizes to allow for drag holes and for wear and tear of dragging :—

Kind of material.	Standard size.	Size to be sawn.
Broad gauge sleepers ..	9′ × 10″ × 5″	9′ 6″ × 10″ × 5¼″
Metre gauge sleepers ..	6′ × 8″ × 4½″	6′ 6″ × 8″ × 4¾″
Kolmarams	15′ × 6″ × 4″	15′ 6″ × 6″ × 4¼″
Chattams	10′ × 6″ × 3″	10′ 6″ × 6″ × 3¼″

Other kinds of material, of different sizes, may be sawn, provided there is an assured demand and they can be economically manhandled down to the plains.

The sleepers must conform to the specifications given in the Madras Forest Pocket Book, as modified from time to time by the Forest Utilization Officer.

Mesua ferrea will usually be converted into broad-gauge sleepers only, especially from remote coupes, metre-gauge sleepers being allowed to be made from broad-gauge ones rejected at any place.

482. On conversion, the Forester in charge of fellings will inspect and pass such of the material at stump-site as comes up to the specifications in force, after which a letter indicating the species, and a serial number, will be chiselled on each. Broad-gauge sleepers,

metre-gauge sleepers, kolmarams and chattams, will be numbered separately, the different species having different distinguishing letters. Thus *Mesua ferrea* will have the letter 'M,' *Palaquium ellipticum* the letter 'P' and so on. The material passed at stump-site will thereupon be brought to stock.

After passing at stump site and numbering, it will be manhandled to the heads of cart-tracks or floatable streams and finally carted to sale depots.

A careful check of the measurements is necessary, on delivery by the dragging coolie. to detect any reduction that he may have made in size to facilitate dragging. The coolies should also be watched when preparing drag holes.

Sawyers and dragging coolies do not find it necessary to stop work completely during the rains except when there is a continuous downpour for days together. It is therefore possible to arrange the extraction so that an almost continuous and uniform supply is maintained at the sale depots in all months. This point should be specially attended to, as continuous work throughout the year is essential to prevent the dispersal of the labour force.

On arrival at the sale depot, the kolmarams and chattams should be stacked properly; the sleepers clamped (after cutting away the drag holes) and stacked according to the instructions of the Forest Utilization Officer.

Forest Code Forms 3, 4 and 5 will be maintained as usual for timber fellings, and depots inspected and the books checked, as prescribed in the Forest Code. Separate pages should be allotted for trees felled in different associations, to enable volume tables for such localities to be prepared separately.

483. All felling and extraction in the sholas should be completed by the 31st of March, to enable regeneration operations to be taken up, while such work in the deciduous forest should be completed by the end of December, so as to allow sufficient time for the burning of slash preparatory to 'gap regeneration.'

SECTION 6.—REGENERATION.

484. The method of regenerating gaps in sholas is largely in the experimental stage, though considerable success has been attained during the last three years in the Silent Valley Coupes I to III and in the Kalladikode Valley, as also in the Wynad and Tinnevelly districts. Some experience in the planting out of one-year old nursery seedlings of *Mesua ferrea* and *Calophyllum elatum* has been gained in the Chenat Nair Reserve. The prescriptions given below are therefore subject to any modifications that may be found necessary as a result of further experience.

1. *Species.*

485. The species that have been found more or less suitable for introduction into sholas are: *Acrocarpus fraxinifolius, Artocarpus hirsuta, Mesua ferrea, Gluta travancorica, Dysoxylum malabaricum* and *Hopea parviflora.* In the deciduous areas teak, *Dalbergia latifolia, Pterocarpus marsupium* and *Artocarpus hirsuta* will be introduced.

486. Of these, *Acrocarpus fraxinifolius, Artocarpus hirsuta,* and *Hopea parviflora* usually affect localities below an elevation of 3,000 feet, in the semi-deciduous zone, but the first two are occasionally met with in the true shola, so that their introduction therein is very likely to meet with success. They have not been met with in any number above 3,500 feet under *typical rainforest conditions,* and their introduction above this elevation is not recommended. The *Poeciloneuorn-Palaquium* association is also probably too wet for them. The Panthanthodu and Ananganthodu valleys of Attapadi Block I and the comparatively dry easterly slopes of Bolampatty Block II appear to be especially suitable for these two species.

487. *Hopea parviflora* proved a failure in the first two years of its introduction in the Silent Valley but has given better results in the third year. The species appears to be better suited for the semi-deciduous or deciduous types at elevations below 3,000 feet and along river banks.

488. *Gluta travancorica* was dibbled in 1931 in the Silent Valley, and the results at the time of writing are encouraging. Since it is a native of Tinnevelly sholas where the rainfall is considerably less than in our sholas, its introduction may, in the first instance, be confined to regions of comparatively low rainfall.

489. *Mesua ferrea* is suitable for all elevations up to 4,500 feet.

490. *Dysoxylum malabaricum* has not been found to occur at elevations above 3,500 feet so that it may be introduced below this elevation in the first instance. Higher elevations may be tried as an experimental measure.

491. Speaking generally, (1) Reed associations, which are generally marshy, are not suitable for the introduction of any of the species mentioned above. Large gaps in such associations may, if necessary, be regenerated with *Poeciloneuron indicum*, *Calophyllum elatum*, *Hopea glabra* or *Bischofia javanica*, dibbled on the naturally formed mounds occurring in such areas, (2) At elevations above 3,500 feet *Gluta travancorica*, *Dysoxylum malabaricum*, and *Artocarpus hirsuta* are not likely to thrive. *Mesua ferrea* will do well at these elevations whatever the rainfall and *Acrocarpus fraxinifolius* is likely to thrive up to 4,000 feet on easterly slopes with lower rainfall, (3) *Dysoxylum malabaricum* shows a preference for well-drained slopes in the neighbourhood of streams, (4) *Palaquium-Mesua* and *Mesua-Calophyllum* associations are the best suited for *Acrocarpus* and the former, which are generally at elevations below 3,300 feet, for *Artocarpus hirsuta*.

2. *Selection of gaps for regeneration.*

492. In the deciduous forest all gaps created by fellings will be taken up for artificial regeneration owing to the general paucity of the natural regeneration of useful species in it.

In the sholas, observation supported by enumeration shows that there is scarcely 10 per cent of the gaps without established regeneration of *Palaquium ellipticum*, not more than 25 per cent without any regeneration of *Mesua ferrea*, and only about 50 per cent of the gaps with no *established Mesua* regeneration. The creation of three gaps per acre is not therefore likely to endanger the essentially evergreen character of the shola, and the percentage of valuable species in the future crop is likely to be adversely influenced only in respect of *Mesua ferrea*, if we were not to regenerate any of the gaps artificially.

493. The natural regeneration of *Palaquium ellipticum* and *Mesua ferrea* existing in the smaller gaps have a reasonable chance of establishing themselves and of developing to maturity, while the larger gaps provide us with the light conditions necessary for the introduction of valuable species like *Acrocarpus fraxinifolius*, and *Artocarpus hirsuta* at their centre, and *Dysoxylum malabaricum* and *Gluta travancorica* at the margin, though their size is likely to have let in so much light that the unestablished natural regeneration therein of *Palaquium* and *Mesua* is likely to be endangered.

494. If, therefore, we artificially regenerate not less than half the number of gaps created by fellings in each coupe, selecting the largest of the gaps for the purpose, and tend the natural regeneration of valuable species in the remaining gaps, we shall be definitely improving the incidence of useful species in our sholas, without unduly increasing the cost of regeneration.

495. The gaps created by the fellings will be numbered, measured, and enumerated for natural seedlings, by the forester in charge of fellings and conversion, when he passes the sawn timber. He will submit to the District Forest Officer, through the Range Officer, a list showing the serial number of the gap, the size of the opening in the canopy as given by the maximum and minimum diameters, and the number of established regeneration and advance growth of *Mesua* and *Palaquium* within the gap. The serial number of a gap, which will be the number on the stump of the tree felled in it, should be painted in tar on a prominent blaze in, or near the gap, and a zinc plate bearing the same number, nailed on the blazed tree. (Regeneration will be considered as established if between 9 inches and 2½ feet in height, and advance growth will be all growth above 2½ feet in height and below about 20 inches in girth.) Three copies of the list will be necessary, one for the District Forest Officer, the second for the Range Officer, and the third for the regeneration forester. The list will form part of the regeneration ledger.

It should be accompanied by the extraction map on which the location and numbers of the marked trees, already exhibited, would show the location and numbers of the gaps except for such of the marked trees as have not been felled for any reason. Trees marked but not felled should be shown distinctively in red.

496. Not less than 25 per cent of the gaps in each subdivision of the coupe should be inspected by the Range Officer, and not less than 10 per cent by the District Forest Officer or his gazetted assistant, in order to check the data furnished by the forester.

497. The District Forest Officer shall provide for the regeneration of all gaps except those below the minimum size of 200 square yards referred to below, unless he is satisfied, from the figures supplied, that there is already ample established natural regeneration of *Mesua ferrea*.

To define exactly what is ample regeneration is not possible. But, speaking generally, a gap may be considered to be sufficiently stocked if it contains, say, 12 to 15 *established* seedlings.

The average size of a gap is less than one chain by half a chain and the smallest are less than half a chain by half a chain. The minimum size of a gap suitable for artificial regeneration is fixed at 200 square yards, provided the width is not less than 10 yards.

It is estimated from past figures that about 75 per cent of the total number of gaps in a coupe will normally require to be artificially regenerated.

3. *Seed collection and treatment.*

498. The importance of the collection of good seed at the right time cannot be overemphasized, especially in the case of shola species. Healthy, well grown, middle aged trees, with spreading crowns, should be selected and retained permanently as mother trees.

499. The pods of *Acrocarpus fraxinifolius* should be collected from February to April, when dry, but before they are blown away by the wind. The pods should be dried in the sun, after which they may be broken up and the seeds extracted.

Seed trees are found in the Silent Valley, Attapadi Blocks I to V and in the Chenat Nair Reserve.

Since good specimens of this species are but rarely met with in our sholas, it is prescribed that no *Acrocarpus* tree situated conveniently for seed collection should be felled.

This species sometimes germinates very slowly, and soaking the seed in concentrated sulphuric acid has been found efficacious. The Provincial Silviculturist should be consulted on this point, and steps taken under his advice, to accelerate germination.

500. The fruits of *Mesua ferrea* ripen usually in April-May, varying with the time of flowering. Sound, deep-brown fruits showing signs of dehiscence, may be considered mature and collected from the swept floor underneath the crown. Trees showing twisted fibre should not be selected as seed trees.

501. Young fruits of *Dysoxylum malabaricum* are usually in evidence in May-June and ripen in the middle of the monsoon in August. The crowns of the mother trees should be isolated by felling surrounding trees and their trunks protected by thorns against red squirrels and monkeys. Seeds should be sown within a week of collection as they are very susceptible to fungus attack, if kept. Good seed trees are available at Chembotti in the Silent Valley, but since the species is rare, it is prescribed that good seed-trees situated conveniently for the collection of seeds should not be felled, wherever found.

502. The fruit of *Hopea parviflora* may be collected from trees on the Bhavani in the Attapadi valley or indented for from the District Forest Officer, South Mangalore. They should be sown within three days of their fall, as they do not keep.

503. *Gluta travancorica* fruits may be obtained from the Tinnevelly district.

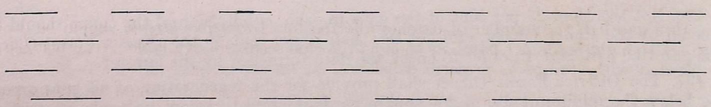
504. For the collection of other seeds, please see paragraphs 565, 566 and 567 of the Teak Conversion Working Circle.

4. *Nursery.*

505. The seeds and seedlings of *Mesua ferrea* and *Dysoxylum malabaricum* are very liable to be destroyed by monkeys, red squirrels and rats, so that it is necessary to grow these species in a protected nursery and plant them out only after they have lost their cotyledons, for the sake of which the young seedlings are often destroyed. The advantages of planting out stumps of *Artocarpus hirsuta*, as against dibbling, have also to be examined. A nursery will therefore be required for raising these three species.

506. The site for the nursery should be selected in a well-drained locality within the shola and not on grass-land. One or more gaps created by Selection fellings may be chosen with advantage and economy. All trees over the area should be removed in order to prevent damage from drip.

Raised beds 10′ × 3′ and 6″ to 9″ high should be prepared along contours, the beds in successive contours being 'staggered,' as illustrated below in order to reduce wash; but drains of sufficient size should be provided to carry off the rain water.



507. It is not possible to estimate the quantity of seed that will be required as the species to be used will vary from year to year according to the type of forest that is being worked, the size and number of the gaps and so on.

Ordinarily only the centres of the lighter gaps will be regenerated with *Acrocarpus* and *Artocarpus*, the peripheries of the larger and the whole of the smaller gaps being regenerated with *Mesua*, *Dysoxylum* and *Gluta*.

On this basis the District Forest Officer will estimate the quantity of seed required, well in advance of the operations and take necessary steps to collect it.

508. The *Mesua* and *Artocarpus* may be grown in the beds at an espacement of 3″ × 3″, but the *Dysoxylum* at 6″ × 6″. One, two and three year old stumps of *Artocarpus* should be tried out, so that a couple of beds will have to be retained for two, and another pair for three years.

509. The beds of *Mesua ferrea* and *Dysoxylum malabaricum* should be protected by a substantial fence of stakes driven into the ground, built like a palisade and about 4 feet high. If such a fence be not effective against vermin, frames of wire-netting should be made, sections of which could be built up *around* and *over* the beds, effectively keeping out all vermin and capable of easy transportation from one nursery site to another. A palisade fence has, however, been reported to give effective protection in Tinnevelly.

5. *Staking and soil preparation.*

510. The gaps finally taken up for regeneration should be staked at an espacement of 4′ × 4′ approximately. Some of the patches should be prepared on the ground underneath the branches of the felled trees, as these provide the necessary shade and protection from game that a young seedling demands. Substantial stakes 3 feet high should be driven in at all the points. No clearing of the understory is usually required, as the sawyers cut down for the sawing platform the less valuable poles of the understory. The ground at each stake should then be cleared of weeds and chips and the soil worked loose with a mamty to a depth of nine inches, and a foot square.

The espacement may be increased to 6′ × 6′ if it be found that, in spite of the closest supervision, the total expenditure on regeneration and tending exceeds an average of eight annas per gap.

It is not necessary to plant right up to the foot of the line of trees on the edge of the gaps as shade will be too dense to allow of satisfactory growth. It is suggested that a width of two yards from the line joining the bases of trees on the edge of the gap may be omitted.

511. The number of prepared patches in a gap will be entered against it in the gap-list referred to in paragraph 495 above.

This work should be completed by the middle of May.

6. *Allotment of gaps for species.*

512. Of the gaps selected for regeneration, the District Forest Officer shall allot the largest for the introduction of *Acrocarpus* and *Artocarpus*, in their centres ; small gaps are unsuitable for the introduction of these species. The other species may be introduced in gaps of any size above the minimum.

In gaps selected for *Acrocarpus* and *Artocarpus* other more shade bearing species will be introduced also round the periphery of the gaps, in such proportion as the District Forest Officer considers advisable.

In gaps too small for *Acrocarpus* and *Artocarpus*, the centre will be reserved for *Mesua ferrea*, *Gluta* and *Dysoxylum* being placed round the periphery.

7. *Methods of regeneration.*

513. *Mesua ferrea* and *Dysoxylum malabaricum* will be raised by planting out one-year old nursery seedlings ; *Artocarpus hirsuta*, partly by planting of stumps and partly by dibbling ; while *Acrocarpus*, *Gluta* and other species, will be raised entirely by dibbling.

8. *Dibbling.*

514. Dibbling of *Acrocarpus* should be completed as early as possible in May, 10 to 15 seeds, spaced properly to avoid overcrowding, being put in each patch. *Gluta* should be dibbled as soon as possible after it is received from Tinnevelly, one or two seeds per patch being sufficient.

In a gap half the number of patches allotted for *Artocarpus hirsuta* should be dibbled with six to eight seeds per patch as soon as the ripe seeds are available. The balance will be planted with stumps as prescribed below.

Gaps in marshy localities which require to be regenerated, should be dibbled with the seeds of *Hopea glabra*, *Calophyllum elatum* or *Poeciloneuron indicum*. The seeds should be sown soon after collection. A handful of *Hopea* seeds and three or four seeds of the other species may be used per patch.

9. *Planting.*

515. The remaining patches allotted for *Artocarpus hirsuta* should be planted with stumps, as early in April as possible ; the method of planting should be similar, where it applies, to that described for the stump planting of teak in paragraph 583 under the Teak Conversion Working Circle.

One-year old nursery plants of *Mesua* and *Dysoxylum* will be similarly planted, in patches allotted for them, as soon as the monsoon sets in, early in June. Detailed instructions for planting out of nursery seedlings will be found in the Madras Forest Pocket Book.

10. *Experimental.*

516. In the Wynad evergreens, *Mesua* seed is dibbled in the gaps; this method is preferable as it is more economical. In the Silent Valley forests, however, dibbled seed of this species is, as has been pointed out above, liable to be destroyed by vermin. In order therefore to decide (1) whether *Mesua* and *Dysoxylum* can be successfully grown from dibblings in fenced patches, (2) whether sowing *Mesua* after the monsoon is not better than before the monsoon, (3) whether deep dibblings will protect the seeds from vermin and (4) whether burning of slash preparatory to regeneration is beneficial, the following procedure is prescribed for three years :—

Fifteen gaps, about half a chain by half a chain in size and conveniently situated for inspection, should be selected and patches prepared as described in paragraph 510 above. When the patches are ready, palisades of reeds or stakes, about 18 inches to 2 feet high, should be built round individual patches and round groups of patches, the stakes being packed close together to prevent vermin from getting through.

In gaps 1 to 5, *Mesua* seeds should be dibbled in May and in gaps 6 to 10, they should be dibbled early in September, when the fury of the monsoon is spent.

Dysoxylum seeds will be dibbled in the first five gaps as soon as they have been collected in August.

In each gap, the patches may be equally divided between these two species and five to six seeds dibbled per patch.

In gaps 6 to 10, half the number of patches allotted for *Dysoxylum* should be planted with one year old stumps early in June and the other half with nursery plants 3 to 6 months old, as soon as the cotyledons on the plant have dried up or dropped. These planted gaps should not be protected by fences ; fencing is prescribed only for the dibbling.

The *Mesua* seeds dibbled in September should be from the same stock that was used in May ; they must be carefully stored in a dry place during the monsoon.

In gaps 11–15, half the number of patches in each gap should be dibbled with *Mesua* seeds 2 inches below the ground-level and the other half similarly dibbled with the seeds of *Dysoxylum*. These patches need not be fenced.

A record of expenditure should be maintained so that a comparison may be made between the cost of these fenced dibblings and of putting out one-year old nursery plants.

In another ten typical gaps the slash will be burnt before regeneration operations are carried out and the results observed. Great care must be taken not to scorch the surrounding evergreen forest.

517. The condition of all these experimental gaps should be noted every month and reports submitted to the Conservator of Forests, Ootacamund Circle, every quarter.

Future regeneration operations should be modified with reference to the results of the experiments prescribed above, and in consultation with the Provincial Silviculturist.

11. *Deciduous forests.*

518. In the gaps created by fellings in the deciduous forests, it is prescribed that at elevations below 3,000 feet, teak should be introduced in the monsoon following the fellings, in the largest gaps. Such areas are confined to the eastern extremity of Panthanthodu valley, and the deciduous area west of Thadikundu, above the teak conversion Working Circle, both in Attapadi Block I, in the Kalladikode valley of the Chenat Nair Reserve and in the Panakadan Reserve.

Dalbergia latifolia, *Pterocarpus marsupium* and *Artocarpus hirsuta*, will be put out along with the teak, in such mixture as the District Forest Officer considers advisable.

Gaps that are too small for teak, or are above 3,000 feet in elevation, will be regenerated with the three other species mentioned above.

519. *Burning.*—The felling refuse and weeds and bamboos should be piled up in each gap and burnt between January and March : a hot fire and as complete a burn as possible will be aimed at, care being taken not to damage the surrounding growth.

520. *Staking and soil preparation.*—The entire gap should be staked approximately 4 feet × 4 feet, and the soil round each stake worked up one foot square and to a depth of 9 inches. This should be completed by the end of April. The espacement may be increased to 6 feet × 6 feet, if it be found that, in spite of the closest supervision, the total expenditure on regeneration and tending exceeds an average of 8 annas a gap.

521. *Dibbling and planting.*—Teak, and *Artocarpus hirsuta* will be raised from stumps ; the other species by dibbling. The desirability of raising *Dalbergia latifolia* also by stump planting should be considered, and the Provincial Silviculturist consulted as to the results of the experiments he is making in this connexion. In the gaps selected for the introduction of teak, the majority of the patches in the lighter part of the gap will be planted with teak stumps one year old. These will be obtained from the nearest teak nursery in the Teak Conversion Working Circle, provision being made in the year previous to felling, for the number of stumps necessary over and above the normal requirements.

The planting should normally be completed by the end of May according to the directions prescribed in paragraph 583 (Teak Conversion Working Circle).

The remaining patches will be divided equally between the other three species.

The patches allotted for *Artocarpus hirsuta* will be planted with stumps of varying ages from the nearest permanent nursery, necessary provision being made as in the case of teak. Planting should be completed by the end of May.

Seeds of *Pterocarpus marsupium* will be dibbled in their respective patches and also at the corners of the patches in which teak stumps have been planted, as prescribed in paragraph 583 (Teak Conversion Working Circle).

A more careful selection of gaps and closer attention to regeneration and tending is necessary in the gap-regeneration of deciduous forests than in the case of the sholas. The personal attention of the District Forest Officer will be required at every stage of the operation if success is to be attained.

12. *Subsidiary Silvicultural Regulations.*

522. *Replacing casualties.*—In both the evergreen and the deciduous forest, casualties in the first year should be promptly replaced, as soon as they occur, from the nursery or from excess plants in other patches, as the case may be ; this may continue till the end of September but not later.

During the second year, the gaps that show a minimum survival of 75 per cent of patches, may be considered to have been successfully regenerated. If casualties are heavier than this they should be made good in the manner prescribed for the primary regeneration.

523. *Weeding and cleaning of artificial regeneration.*—Gaps in the sholas are not generally infested with rank growth as in the deciduous and the semi-deciduous forests.

The prominent weeds of the sholas are :—

Toddalia asiatica, Paramignya armata, Elettaria cardamomum, Macaranga roxburghii, Strobilanthes sp., Laportea crenulata, Heckeria subpeltata, Leea sambucina, the wild plantain and the wild arrowroot.

The first two are the chief thorny weeds that have to be kept in check by cutting and uprooting, while the rest have to be dealt with more in the nature of a cleaning than of a weeding.

Acrocarpus and *Artocarpus* seedlings would appear to require complete overhead light from the start ; they must be carefully tended and must not be allowed to be suppressed by fast growing softwoods. The fact is emphasized that all that is necessary is for the young plants to have their heads free ; general removal of all weed growth is undesirable.

The requirements of *Dysoxylum, Mesua* and *Gluta* in this respect, have yet to be definitely ascertained, but the indications are that if they are kept free from the thorny weeds mentioned above, the protection afforded by most of the other quick growing species is likely to be to their advantage for the first few years. Heavy shade from cardamoms, wild arrowroot, *Heckeria, Laportea* and the wild plantain, must, however, be removed.

The weeding and cleaning in the first year should be completed by the end of October following regeneration. In the second year, a weeding and cleaning will be done, along with the replacement of casualties, early in the monsoon, and a similar final tending at the end of the second monsoon.

It is anticipated that no further tending will be necessary ; but since our knowledge of the requirements of the evergreen species is very limited, the Provincial Silviculturist should be consulted and the orders of the Conservator obtained.

13. *Tending of natural regeneration in gaps.*

524. Natural regeneration of valuable species like *Mesua ferrea, Palaquium ellipticum Calophyllum elatum, Hopea glabra* and *Poeciloneuron indicum,* in *all* the gaps created by fellings, whether artificially regenerated or not, will be tended. This also will probably be necessary for two years only.

The tending will consist of keeping the *heads* of the established natural regeneration and advance growth of the valuable species free from weeds and quick growing soft woods, so as to give them more light, without unduly exposing the soil to dessication. *Mesua ferrea* should be given preference over all the other species, during the course of tending.

14. *Tending of natural regeneration in the unfelled parts of the coupe.*

525. Natural regeneration of the valuable species mentioned in paragraph 524 above, occurs in considerable quantities all over the forest and in all stages of development. Groups of the advance growth of *Palaquium* are especially prominent, though other species are also met with.

It would be desirable to tend such regeneration over the whole coupe every year; but in the present state of our knowledge about the silvicultural needs of the shola species, this is not considered possible now. However, the marking officer, who has to go over the whole coupe, can, at a small extra cost and a little more time than is required for marking, carry out a certain amount of tending. It is therefore prescribed that the marking officer shall carry out the tending of the natural regeneration of valuable species over the whole coupe to such an extent as is possible during the course of the marking operations. For this purpose he shall take with him 2 or 3 extra coolies whose work it will be to cut back such growth as he instructs them to remove for the purpose of assisting the natural seedlings and saplings that he may come across. It has already been prescribed under the marking rules that all interfering climbers should be cut.

526. In addition to the above, in order to arrive at the best method of tending the natural regeneration, about which at present our knowledge is scanty, tending on the following lines should be carried out in the year following the felling over one-tenth of the area of one of the annual coupes in each of the two series :—

1. Poles will be left to look after themselves.

2. Promising patches of unestablished and established regeneration of the valuable species will be tended by the judicious removal of the undergrowth standing over them. The object should be to let in light through the top and the middle canopy. (Unestablished regeneration is regeneration below 9 inches in height, established regeneration is that between 9″ and 2½′ and undergrowth is valueless shrubby growth up to 15 feet high, and *Strobilanthes.*) Care must be taken in this experimental stage not to cut too much.

3. Promising advance growth (including saplings) of the valuable species will be tended by the judicious removal, wherever required, of the undergrowth and the valueless middle story trees up to six inches in diameter, interfering with the admission of light.

The object should be to provide ample light through the top canopy only.

4. *Strobilanthes* should be cut below the node from which stilt roots run into the soil.

5. In the course of tending, *Mesua ferrea* should be given preference over all other species, with the exception of *Acrocarpus* and *Dysoxylum.*

15. *Consultation with the Provincial Silviculturist.*

527. In connexion with all the regeneration and tending operations prescribed above, the Provincial Silviculturist must be frequently consulted. For definite experiments, experimental plot files must be maintained.

16. *Inspection paths.*

528. The graded paths referred to in paragraph 477 above will serve as main inspection paths, in addition to any existing or proposed bridle-paths. But for the proper inspection of regeneration works a more extensive but temporary system of paths is indispensible. These may be made by merely clearing the undergrowth and saplings of inferior species to a width of about 5 feet, at a cost not exceeding Rs. 3 a mile. About 7 miles of such paths will be required per square mile of the coupe. They need be kept open only till the close of all tending operations within the coupe.

17. *Demarcation of Coupes and Tended Areas.*

529. The boundaries of coupes follow natural features, generally. The number of the coupe and the year of felling should be chiselled on wooden boards 18″ × 9″, which should be nailed on to trees on the boundary in prominent places and along paths. A sufficient number of boards to indicate the boundary without causing any confusion, should be provided. *Mesua* planks are recommended.

Where the boundary does not follow pronounced natural features, it should be demarcated by a cleared line 15 feet wide. Only undergrowth and the middle story trees up to about 6 inches in diameter need be cut when clearing the line.

The tenth of the coupe prescribed for special tending in paragraph 526 should be similarly demarcated by cut lines, also 15 feet wide, and wooden signboards bearing the letter 'T' followed by the year of tending.

SECTION 7.—CONTROL.

530. The following Control Records will be maintained; the District Forest Officer will be personally responsible for their correct posting.

1. *The Control Book.*—A sample form will be found in Appendix II (*a*). Pages should be allotted separately for each series.

2. *The Record of Works.*—An annual record of all operations carried out in the working circle shall be maintained for each felling series, the cost of each item being shown separately. A sample form is given in Appendix II (*b*).

3. *The Annual Summary of Revenue and Expenditure.*—The form is given in Appendices II (*c*) and II (*d*).

4. *The Nursery Ledger.*—A ledger should be maintained for each nursery. The cost of every operation connected with the nursery, clearing site, making or remaking beds, seed collection, fencing, notching, weeding, manuring and the like, should be shown separately. A sample form is given in Appendix II (*g*).

5. *The Regeneration Ledger and Gap List.*—This should be maintained separately for each coupe. A sample form is given in Appendix II (*e*).

6. *The Control map.*—This should be on a scale of 8 inches = 1 mile and should be prepared for each coupe separately, the compartments constituting the coupe being drawn in. Gaps regenerated, and permanent and temporary inspection paths should be marked on it. Prominent patches of natural regeneration and advance growth of the valuable species that have been noticed in the coupe, gaps in which natural regeneration is prominent and any other interesting silvicultural features, which, if shown in the map, will result in a useful stock-map of the area, should also be entered.

531. An annual statement of operations is furnished below :—

Tabular Statement of operations in the Selection Working Circle.

Year.	Marking cum tending.		Felling.		Regeneration and tending.		Tending second year.		Special tending.	Remarks.
	Coupe.	Net area (excluding blanks).	Coupe.	Net area (excluding blanks).	Coupe.	Net area (excluding blanks).	Coupe.	Net area (excluding blanks).		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1933–34	S.V.C. VII	2,606	S.V.C. VI	427	S.V.C. V	1,285	S.V.C. IV	1,223*	1/10 of CX	* Compartments 4 a, 6,7, & part of 3 X to be decided by District Forest Officer.
	Att. C. V	1,351	Att. C. IV	628	Att. C. III	591	Att. C. II	1,143	1/10 of CY.	Y Do.
1934–35	S.V. C. VIII	668	S.V.C. VII	2,606	S.V. C. VI	427	S.V. C. V	1,285*	1/10 of CX.	* Includes Compt. 15 and part of 16.
	Att. C. VI	1,338	Att. C. V	1,351	Att. C. IV	628	Att. C. III	591	1/10 of CY.	
1935–36	S.V. C. IX	497	S.V.C. VIII	668	S.V. C. VII	2,606	S.V. C. VI	427	1/10 of CX.	
	Att. C. VII	911	Att. C. VI	1,338	Att. C. V	1,351	Att. C. IV	628	1/10 of CY	
1936–37	S.V. C. X	375	S.V.C. IX	497	S.V. C. VIII	668	S.V. C. VII	2,606	1/10 of CX.	
	Att. C. VIII	418	Att. C. VII	911	Att. C. VI	1,338	Att. C. V.	1,351	1/10 of CY.	S.V. = Silent valley.
1937–38	S.V. C. XI	930	S.V.C. X	375	S.V. C. IX	497	S.V. C. VIII	668	1/10 of CX.	Att. = Attapadi.
	Att. C. IX	960	Att. C. VIII	418	Att. C. VII	911	Att. C. VI	1,338	1/10 of CY.	
1938–39	S.V.C. XII	691	S.V.C. XI	930	S.V. C. X	375	S.V. C. IX	497	1/10 of CX.	
	Att. C. X	1,953	Att. C. IX	960	Att. C. VIII	418	Att. C. VII	911	1/10 of CY.	
1939–40	S.V. C. XIII	806	S.V.C. XII	691	S.V. C. XI	930	S.V. C. X	375	1/10 of CX.	
	Att. C. XI	802	Att. C. X	1,953	Att. C. IX	960	Att. C. VIII	418	1/10 of CX.	
1940–41	S.V. C. XIV	715	S.V.C. XIII	806	S.V. C. XII	691	S.V. C. XI	930	1/10 of CX.	
	Att. C. XII	1,902	Att. C. XI	802	Att. C. X	1,953	Att. C. IX	960	1/10 of CY.	
1941–42	S.V. C. XV	3,008	S.V.C. XIV	715	S.V. C. XIII	806	S.V. C. XII	691	1/10 of CX.	
	Att. C. XIII	1,790	Att. C. XII	1,902	Att. C. XI	802	Att. C. X	1,953	1/10 of CY.	
1942–43	....	..	....	..	S.V. C. XIV	715	S.V. C. XIII	806	1/10 of CX.	
					Att. C. XII	1,902	Att. C. XI	802	1/10 of CY.	

CHAPTER III.—WORKING PLAN FOR THE TEAK CONVERSION WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE WORKING CIRCLE AND THE CHARACTER OF THE VEGETATION.

532. The working circle covers parts of the Chenat Nair Reserve, Puliampalli Tope Reserve, Dhoni Reserve, Attapadi Blocks I, IV and V, and the Panakadan Reserve. Areas in all the above reserves suitable for clearfelling and planting with teak are included in this working circle. The following table shows the area of each reserve so included :—

Reserved Forest.	Area included in the Teak Conversion Working Circle.
	ACS.
1. Chenat Nair	1,679
2. Puliampalli Tope	20
3. Attapadi Block I	248
4. Attapadi Block IV	74
5. Attapadi Block V	390
6. Panakadan	250
7. Dhoni	45
Total ..	2,706

In the Panakadan and Chenat Nair Reserves, belts of forest bordering the plains, where the soil is of fair depth, have been selected. The elevation varies from 300′ to 750′. An area of 53 acres in the Chenat Nair Reserve at an elevation of 1,500′ and lying in the semi-deciduous zone, has also been included.

In the Attapadi Blocks, areas on the banks of the Bhavani, at elevations between 1,750′ and 2,500′, have been selected.

533. The existing growth consists mainly of deciduous species, like *Xylia xylocarpa*, *Terminalia tomentosa* and *Terminalia paniculata*, *Pterocarpus marsupium*, *Grewia tiliaefolia*, *Adina cordifolia*, *Chukrassia tabularis*, *Albizzia sp.*, *Bombax malabaricum*, *Dalbergia latifolia*, *Anogeissus latifolia*, *Artocarpus hirsuta* and *Artocarpus integrifolia* and a few teak, natural and planted.

534. In the Chenat Nair Reserve, the area selected in the Dhoni beat was originally worked under the coppice with standards system for the most part. In Elival, the area was heavily 'logged' by the Forest Exploitation Division, leaving very little useful timber on the ground. In the Kalladikode and Puliampalli valleys, all available sleepers of *Xylia xylocarpa* and some miscellaneous timber, have already been extracted.

535. The Puliampalli Tope Reserve of 20 acres is a teak plantation formed in 1919, and so is now 12 years old.

536. The Panakadan area has not been worked since its reservation in 1906.

537. Part of the area in Attapadi Blocks I, IV and V appears to have been kumried by the hill-tribes prior to reservation. Areas not so kumried, and some of the kumried areas, contain magnificent specimens of *Dalbergia latifolia* (Rosewood).

538. There is no bamboo in the Dhoni and Puliampalli beats of the Chenat Nair Reserve and very little in the Panakadan Reserve. In the Kalladikode and Elival valleys the bamboos have not yet seeded gregariously and died, but in Attapadi Blocks I, IV and V, young bamboo of about ten years of age occurs in patches.

539. An area of about 330 acres has been regenerated with teak between 1918 and 1932, in the Chenat Nair and surrounding reserves : details will be found in the next section.

SECTION 2.—DIVISION OF THE AREA.

(a) *Blocks.*

540. The area divides itself naturally into the following blocks :—

		ACS.
Chenat Nair Reserve and Dhoni Reserve-	1. Dhoni-Puliampalli Block	774
	2. Sappal-Elival Block	793
	3. Puliampalli Tope Block	20
	4. Kalladikode Block	157
Attapadi Block I	5. Thadikundu Block	248
Attapadi Blocks IV and V	6. Chindaki Block	464
Panakadan Reserve	7. Panakadan Block	250
	Total ..	**2,706**

541. (1) *The Dhoni-Puliampalli block* occupies the terai portion of the Dhoni and Puliampalli beats, and includes the Dhoni Reserve. Ten future coupes of the felling series concerned have been demarcated on the ground by cut lines and stones, with the number of the coupes engraved on them, have been planted at all corners. The rest of the block has been marked on the map, approximately.

(2) *Sappal-Elival block.*—This block has been completely demarcated on the ground by a cut line six feet broad on the upper hill slope. The area has been shown approximately on the map, which also shows the portions excluded as unsuitable within the block, on account of rock or swamp.

(3) *The Puliampalli Tope block* is a reserve by itself and has been completely planted with teak in 1919.

(4) *The Kalladikode block* is in the valley of that name and has been marked on the map approximately.

(5) *The Thadikundu block* lies above the village bearing that name. Its boundaries have been shown approximately on the map.

(6) *The Chindaki block* lies along the Bhavani.

(7) *The Panakadan block,* in the Panakadan Reserve, has also been approximately shown on the map.

(b) *Felling series.*

542. Because of different soil qualities, and since there is a good demand for teak poles in the neighbourhood of certain of the blocks but not of others, two different rotations will be adopted. This necessitates more than one felling series.

Also some of the areas are at a considerable distance from the others, and are situated in different ranges.

Four felling series have therefore been formed—Elival and Dhoni in the Palghat Range and Chindaki and Panakadan in the Mannarghat Range. The following table exhibits their constitution ; the existing plantations have been allotted to these felling series as shown :—

Felling series.	Distribution and area.		Area regenerated up to 1932.			Cost of formation up to date.	Remarks.
	Reserves.	Area in acres.	Locality.	Year of formation.	Area in acres.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						RS. A. P.	
Dhoni series ..	Chenat Nair	729	Dhoni Reserve	1918	5·5	350 0 0	
	Puliampalli tope ..	20	Do.	1919	13·75		
	Dhoni	45	Puliampalli tope ..	1919	20·0	157 0 0	
			Chenat Nair reserve ..	1928	4·0	91 0 0	
	Total ..	**794**	Do. ..	1929	22·0	870 0 0	
			Do. ..	1930	20·6 *		* Plantations adjoining each other and so forming one unit.
			Dhoni	1930	2·0	809 0 0	
			Chenat Nair	1931	15·5 *	662 0 0	
			Dhoni Reserve	1931	4·0		
			Chenat Nair	1932	19·0	Incomplete.	
				Total ..	**127·35**		
Elival series ..	Chenat Nair Reserve (Elival, Sappal and Kalladikode valleys).	950	Elival	1919	8·75	144 0 0	ACS.
			Do.	1928	21·0	470 0 0	Elival valley 740
			Sappal	1928	5·0	117 0 0	Sappal already planted. 53
			Do.	1929	13·0	488 0 0	Kalladikode valley .. 157
			Elival	1929	32·5	696 0 0	
			Sappal	1930	35·0	1,879 0 0	Total .. **950**
			Elival	1931	55·0	1,576 0 0	
			Do.	1932	13·5	Incomplete.	
				Total ..	**183·75**		

	Distribution and area.		Area regenerated up to 1932.				
Felling series.	Reserves.	Area in acres.	Locality.	Year of formation.	Area in acres.	Cost of formation up to date.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						RS. A. P.	
Chindaki series ..	Attapadi Block I ..	248	..	..	..	..	
	Do. IV ..	74	..	..	..	..	
	Do. V ..	390	Nil	..	..	..	
	Total ..	712					
Panakadan series ..	Panakadan	250	Nil	..	..	..	
Unallotted but falling within the Dhoni series.	Chenat Nair		Puliampalli old coupes I and II.	1918	16 *	329 0 0	* The stocking is poor; may be clearfelled and regenerated along with rest of the area when the time comes as it will then be about 25 years old.
			Korma	1875	4·5 †	..	† Will be clearfelled along with coupe IX Dhoni series in 1936 and the resulting coppice shoots retained to form part of the regeneration.

SECTION 3.—ANALYSIS AND VALUATION OF THE CROP.

543. No enumerations were made in the Chenat Nair Reserve as most of the valuable trees on the area have been exploited during logging and as the annual areas for clearfelling will be sold by auction.

All rosewood (*Dalbergia latifolia*) and other valuable species in Attapadi Block I have been enumerated, above a breast height diameter of 12 inches, but only a few of these are found inside this working circle; these were not enumerated separately.

Most of the area in Attapadi Blocks IV and V has been kumried in the past and contains no valuable growth. A narrow strip along the Bhavani, of small extent, contains a few *Terminalia tomentosa*, mixed with less valuable species.

A fifty per cent enumeration of all valuable species over 12 inches in diameter at breast height has been made over the Panakadan Reserve. The incidence of *Xylia* per acre is 6·19, of *Terminalia paniculata* 3·76, *Lagerstroemia* 2·05, *Grewia* 1·53 and *Terminalia tomentosa* 1·07.

The results of enumeration will be found under Chapter VI, Part I.

SECTION 4.—METHOD OF TREATMENT.

(*a*) *Silvicultural System.*

544. The object of management is the replacement of the relatively valueless stock by plantations of Teak in mixture with other valuable species, such as *Dalbergia latifolia*, *Artocarpus hirsuta*, *Xylia xylocarpa*, and *Pterocarpus marsupium*, wherever suitable.

To secure this object, selected areas will be clearfelled annually and regenerated artificially with the valuable species decided upon.

The silvicultural system proposed is thus 'clearfelling', followed by concentrated artificial regeneration.

(*b*) *Choice of species.*

545. The demand for teak of all sizes, from poles to large timber, the attractive prices obtained for it, its rapidity of growth, the comparative ease with which it may be regenerated and the suitability of the locality, all point towards its selection as the principal species.

546. To guard against extensive damage from insects and the deterioration of the soil attendant upon pure teak plantations, the teak will be grown mixed with *Dalbergia latifolia*, *Pterocarpus marsupium*, and *Artocarpus hirsuta*, in plantations in which large timber is proposed to be grown; naturally grown tree species will also be retained where possible.

547. The Forest Products Research Laboratory at Princes Risboro' has recently examined the commercial possibilities of mahogany (*Swietenia macrophylla*) grown in South India. The fact that in certain paragraphs they have referred to it as Burma mahogany must not be allowed to confuse the issue. The timber as well as being tested scientifically and examined by the experts has been submitted for manufacture by certain commercial cabinet makers. The results have been eminently satisfactory and the fact has been established that this species when grown in India, is as good as the Honduras mahogany

of commerce. Further the specimens sent though less than 40 years old were over 6 feet in girth. It is therefore clear that this timber can be grown on a comparatively short rotation with success. It does not object to a laterite soil, but experience has indicated in the past that it is inclined to be attacked by a shoot-borer, which results in forking and malformation, unless it is planted under shade. Further in Nilambur under—planting of teak with this species has been markedly successful.

It is therefore prescribed that in the 1919 plantation, in Elival, *Swietenia macrophylla* be introduced in 1939, when the plantation is 20 years old. If the result is satisfactory, and it grows well, other plantations should be similarly underplanted subsequently. The rotation for this teak has been tentatively fixed at 70 years ; the mahogany will then be 50 years old and should be ripe for cutting some five to ten years later.

548. In plantations proposed for growing teak poles on a short rotation, the introduction of an underwood of *Xylia xylocarpa*, coppice or seedling grown, natural or artificial, will be attempted, along with an admixture of naturally grown tree species.

(c) *Exploitable size and rotation.*

549. The rotations prescribed below for the different felling series have been more or less arbitrarily fixed with the purpose of affording some basis for arriving at the annual plantable area under each series, out of the total area in it suitable for teak. Each series would then form a normal series of age gradations, by itself, with its attendant advantages.

The decision was based on observations on the nature of the soil in each series, on the existing stand of teak and other trees in them, on the results of stem analysis of teak already growing on the areas and on the local demand for teak poles.

550. *Elival and Chindaki series.*—In these two series, the soil is generally better and deeper than in the other two, and laterite is practically absent ; teak occurs naturally and the existing stand of natural forest is of good quality. The localities are therefore suitable for growing teak of a large size. A plantation of teak raised in 1919 in the Elival valley, showed an average height of 55 feet in 1932, and an average girth of 26 inches.

Two naturally grown teak from the neighbourhood of the Chindaki series (and two planted teak in the Dhoni Series) were cut and stem analyses were made ; the results are exhibited in the following statement :—

Statement of Stem analysis of teak.

Age.	Chindaki series.				Dhoni series.				Nilambur teak yield tables.					
	Teak 1.		Teak 2.		Teak 1.		Teak 2.		Quality 1.		Quality 2.		Quality 3	
	Height.	D.B.H.	Height.	D.B.H.	Height.	D.B.H.	Height.	D.B.H.	Height.	D.B.H.	Height.	D.B.H.	Height.	D.B.H.
25 years ..	40′	27·7″	44′	38″·8″	55′	28·3″	62′	25·8″	81′	37″	69′	29·9″	57′	22·8″
40 ,, ..	48′	44·0″	61′	55″	65′	41·4″	71′	42·4″	98′	50″	84′	41·2″	71′	32·4″
50 ,, ..	52′	53·4″	70′	64″	70′	48·7″	75′	51·3″	..		..		..	
70 ,, ..	58·5	72·3″	..		..		..		118′	71·2″	100′	57·3″	83′	43·3″

It will be seen that though the height growth is poorer than even Nilambur third quality, at all ages, the girths at breast height are, on an average, equal to, or better than, the best Nilambur teak. That the height growth is poorer is probably due partly to the fact that the trees were *not* plantation grown. At any rate, trees of between Nilambur second and third quality may justifiably be expected from these areas, on these data. Since Nilambur works on a rotation of seventy years, the same rotation has been tentatively fixed for these two series. Such alterations as future data from plantations in these two series indicate, may be made when the plan is revised.

551. *Dhoni and Panakadan series.*—There is a good local demand for teak poles of about 2 feet girth at the base in Palghat, where they sell at Rs. 1–4–0 each. The stem analyses of two plantation grown teak 55 years old, at Korma, in the Dhoni series, indicate that they fall rather below Nilambur, third quality, vide table above. But the excellent girth increment seems to point to the fact that the height growth was for some reason or other not normal, and it is therefore anticipated that the quality will be found to lie nearer second than third. The average girth and height of dominant trees in the 1919 plantation in Dhoni reserve were measured in 1932 and found to be 23·8 inches and 48 feet, respectively. These data support the previous conclusion. At the end of 25 years, therefore, an average girth exceeding 24 inches and a stand of about 250 stems per acre might be expected in this type of locality. An acre of such poles might be reasonably expected to sell for at least Rs. 150, whereas the existing fuel coupes fetch only about Rs. 90 an acre. If the second rotation crop, and subsequent crops, of teak poles be obtained from coppice

shoots resulting from trees felled at the end of the first, regeneration costs would be very low and there would be a large increase in future profits. The second rotation poles are also likely to be of larger girth as they would be coppice shoots. An underwood of *Xylia* in the teak plantations is expected to increase the value of the coupe by another Rs. 20 or so per acre.

The soil in the Dhoni and Panakadan series is inferior to that in the other two series, so that teak on them is likely to be slow-grown. Teak poles will therefore be grown on a rotation tentatively fixed at 25 years now, but subject to such alterations as future data from these plantations, and the size of poles then in demand, may determine. The second rotation crop (and subsequent crops) of teak poles might profitably be obtained from coppice shoots, as suggested above.

The existing crop of miscellaneous species in the Panakadan reserve has little sale value since there is no demand for fuel in the absence of any large towns in the neighbourhood. Teak poles command a sale, however, at all times.

(*d*) *Annual coupes.*

552. The area of the annual coupe of each felling series is obtained by dividing the area of the felling series by its tentative rotation.

The annual coupes for the different series will thus be :—

1. Elival series 950/70 = 14 acres approximately.
2. Dhoni series 794/25 = 32 do.
3. Chindaki series 712/70 = 10 do.
4. Panakadan 250/25 = 10 do.

(*e*) *The yield.*

553. (1) *Chindaki series.*—In Attapadi Blocks I, IV and V, the plantable area comes partly under the Selection Working Circle and will be worked for merchantable timber under its prescriptions. The rest of the growth on this area is unsaleable on account of remoteness. The remainder of the felling series, which does not come under the Selection Working Circle, contains mainly regrowth from old kumri fellings, about 25 years old, which is also unsaleable. A narrow strip, of small extent, along the banks of the Bhavani, supports a few trees of *Terminalia tomentosa* mixed with other less valuable species. The yield for Chindaki Felling Series, will therefore be fixed only by area.

554. (2) *Panakadan series.*—From the *Panakadan Reserve* it is unlikely that any fuel can be sold, as there are no large towns in the neighbourhood and as there are extensive private forests adjoining it. From the enumerations referred to in paragraph 543, the following statement has been prepared showing the number of exploitable trees of the more important species on the area of the annual coupe :—

Stand per ten acres of the Panakadan Reserve (above 12″ D.B.H.)

Species.	Diameter class.									
	12″–16″. D.B.H.	16″–20″. D.B.H.	20″–22″. D.B.H.	22″–24″. D.B.H.	24″–28″. D.B.H.	28″–32″. D.B.H.	32″–36″. D.B.H.	36″–40″. D.B.H.	Above 40″. D.B.H	Total.
Xylia xylocarpa	29·1	17·6	6·4	3·6	3·5	1·3	0·3	0·0	0·1	61·9
Terminalia paniculata	11·7	9·0	3·3	2·9	4·2	2·3	1·5	0·8	1·9	37·6
Lagerstroemia lanceolata	6·7	4·8	3·0	1·6	2·4	0·9	0·5	0·3	0·3	20·5
Grewia tiliaefolia	7·9	4·9	1·3	0·3	0·5	0·3	0·1	0·0	0·0	15·3
Terminalia tomentosa	4·7	3·2	1·3	0·5	0·5	0·2	0·2	0·1	0·0	10·7
Albizzia sp.	2·7	2·7	1·6	1·0	1·0	0·6	0·2	0·0	0·0	9·8
Artocarpus hirsuta	0·6	0·6	0·3	0·1	0·6	0·2	0·1	0·0	0·7	2·5
Dalbergia latifolia	1·0	0·5	0·2	0·1	0·1	0·0	0·0	0·0	0·0	1·9
Pterocarpus marsupium	0·3	0·3	0·2	0·1	0·1	..	..	..	..	1·0
Tectona grandis *	0·3	0·4	0·1	0·1	0·1	..	..	..	..	1·0
Artocarpus integrifolia	..	0·1	..	..	..	..	..	..	..	0·1

* Concentrated in a small plantation in Panakadan Extension I.

If the annual coupe is felled after selection fellings have passed over it according to the prescriptions of the Selection Working Circle, the yield by clearfelling may be obtained by deducting the trees removed in the selection fellings, from the total stand as given above. The annual yield will, however, be regulated by area, since it is proposed to convert the coupes into regular teak plantations.

555. (3) *The Dhoni Felling Series* consists mainly of areas worked in the past for fuel or railway sleepers and does not therefore contain valuable timber. The annual coupes will however find a ready sale by auction, as did the fuel coupes here in the past, and the yield will therefore be regulated by area.

556. (4) *The Elival felling series* (with the exception of Kalladikode) has been heavily 'logged' by the Logging Engineering branch, leaving behind little timber of value. There is, however, some fuel and small timber and the annual coupes should find a sale in auction ; the yield will therefore be regulated by area as in the previous series.

(*f*) *Method of executing the fellings.*

557. (1) *Dhoni series.*—The next ten coupes of the Dhoni series have been demarcated on the ground, with coupe-stones at all corners, bearing the number of the coupes. They are also marked on the map and their areas have been computed approximately (vide tabular statement of fellings below). Four more coupes have been indicated on the map Future coupes will be allotted when the working plan is revised.

The coupe-lines should be cut every year and the coupe accurately surveyed by the Range officer, who will submit a plan of it, with the field-book, to the District Forest Officer, well in advance of the date of auction.

The coupe will be sold in auction by the District Forest Officer to a contractor, who will clearfell it under an agreement in a form similar to that at present in use in the division.

No trimming of stools need be insisted on, as long as all growth is cut flush with the ground, or not more than an inch or two above it.

The lease shall not extend beyond the end of December, in view of the method of regeneration prescribed below.

558. (2) *Elival series.*—The Sappal valley has been completely planted up.

The plantable area in Elival valley has been demarcated by a cut line, six feet broad, marking the upper limit, and the maintenance of the line entrusted to the District Forest Officer. It has been roughly marked on the working plan map, which also shows the rocky, sandy or marshy localities therein unsuitable for teak.

The plantable area in Kalladikode valley has also been marked on the working plan map.

The area suitable for planting between the 1929 and 1932 plantations is about 40 acres ; this should be taken up for planting in 1933, 1934 and 1935, in three equal areas. On its completion, the annual coupe of 14 acres should be taken up for planting in the Elival valley as shown on the map and proceeding westwards. It is prescribed that the planting should proceed in a westerly direction as this will reduce spread of weeds into the current coupe from the previous one, the westward spread of *Compositous* weeds (such as *Cosmos*) taking place mainly in the south-west monsoon.

The coupe will be surveyed by the Range officer, who will submit a plan of it, along with the field-book, to the District Forest Officer, well in advance of the date of auction. On the area being approved by the District Forest Officer, it will be sold in auction by him, under the conditions prescribed for the Dhoni series.

559. (3) *Panakadan series.*—The plantable area has been shown on the map, approximately.

The coupe of 10 acres should be laid out by the Range officer every year as shown on the map. In selecting the coupe, care should be taken to see that only areas suitable for teak are included in it. Implicit reliance should not be placed on the maps as they are on a small scale, and the boundary of the working circle has only been drawn in approximately.

The prescriptions for the survey and auction of the coupe will be the same as those for the Dhoni series.

If any difficulty be experienced in getting a reasonable offer for the coupe, the saleable timber in it will be extracted and sold departmentally (for which purpose funds will have to be provided, provisionally, and surrendered if not required)—the unsaleable material being felled by the 'kumridars,' as prescribed for the Chindaki series, since it is proposed to regenerate the coupe along with 'kumri' (shifting cultivation).

Trees along the coupe boundary suitable for nailing signboards on, as prescribed in paragraph 605 below, should be retained for that purpose.

560. (4) *Chindaki series.*—The plantable area has been shown on the map, approximately.

The first coupe of 10 acres will be selected to the west of the village of Thadikundu, outside the area set apart for cultivation by the villagers. The subsequent coupes will progress successively westwards, as shown on the map. The coupes will be selected, surveyed and approved as prescribed for the Panakadan series.

Any saleable timber in the coupe, such as teak, *Dalbergia latifolia, Pterocarpus marsupium, Artocarpus hirsuta, Terminalia tomentosa* and *T. paniculata* (with the exception of those required for nailing signboards on) shall be felled departmentally, converted to sizes suitable for extraction and sale (such as railway sleepers, kolmarams, spokes and felloes) and extracted out of the area by the end of December.

If a contractor be forthcoming for coupes of this series, they may be sold to him on conditions similar to those prescribed for other series.

It is proposed to regenerate the coupe along with ' kumri '. The unsaleable material will therefore be felled by the kumridars, under departmental supervision, and piled up in heaps, ready for burning, before the end of February.

SECTION 5.—REGENERATION.

(a) *General.*

561. The clearfelled coupes in each of the four felling series will be regenerated with teak, except in localities inclined to be swampy, where *Terminalia tomentosa* will be grown: such swampy areas are very limited in extent.

The teak will be raised by stump-planting at an espacement of 6 feet × 6 feet: the *Terminalia tomentosa* by notching of germinating seeds, at the same espacement.

If the supply of stumps prove insufficient in any year, other methods may be employed such as dibbling, or notching of germinating seeds.

It is considered essential that the teak should be grown mixed with other species, as, under pure teak woods, there is danger of soil deterioration.

562. In the *Elival* and *Chindaki series*, where the teak will be grown on a long rotation, the mixture will be obtained by (1) the dibbling of seeds of *Dalbergia latifolia* and *Pterocarpus marsupium*, in the same patch as the teak, along the first and second rows of teak, respectively, (2) the stump-planting of *Artocarpus hirsuta* in between the next two rows in quincunx, the two operations mentioned above being repeated over the whole area, and (3) taking great care to retain, in cleanings, such adventitious tree species as appear naturally on the area.

If the supply of stumps of *Artocarpus* prove insufficient in any year, dibbling of seeds may be resorted to.

Any deficiency of seeds in any of the three subsidiary species mentioned above may be made up by using a correspondingly larger proportion of the species which are available.

If these operations are found after three years' trial to be unsatisfactory proposals for modification will be submitted by the District Forest Officer.

563. In the *Dhoni* and *Panakadan series*, where teak is to be grown on a short rotation, the mixture will be obtained by (1) retaining, in cleanings, such adventitious tree species as appear naturally on the area and (2) increasing the underwood of *Xylia Xylocarpa* artificially to spread it over the whole plantation.

564. In the *Chindaki* and *Panakadan* series, the tree species will be raised along with field-crops ' (kumri) '.

(b) *Seed collection and treatment.*

565. *Seed-trees.*—The importance of the proper selection of seed bearers and of the collection of ripe, sound seeds, can scarcely be over-emphasised. Healthy, well grown, dominant trees in full youthful vigour and with spreading crowns, should be selected and marked for permanent retention as seed bearers; plantation grown trees are not recommended. As far as possible seeds should be collected from localities similar in altitude, climate and soil, to that where they are to be used.

Teak seeds from Walayar will be used in the Chenat Nair reserve, as few naturally grown teak are available in the vicinity; for the Attapadi and Panakadan reserves, seeds may be obtained from the neighbourhood of Thadikundu, in Attapadi Block I.

A teak tree may be expected to yield about 80 lbs. or roughly two bags of seeds; a *Dalbergia latifolia*, about 75 Madras measures; a *Pterocarpus marsupium*, about 50 Madras measures; and an *Artocarpus hirsuta*, about 10 lbs. of seeds.

566. *Time of collection and treatment.*—Teak seeds should be collected in December-January; *Dalbergia* seeds in March; *Pterocarpus*, in February-March; and *Artocarpus*, in May-June.

Teak seeds should be soaked in cold water for 48 hours before sowing. Sound seeds, as collected, should be used: large specially selected seeds are not recommended, as there are indications that the percentage of germination of such seeds is below the average. The Provincial Silviculturist should, however, be consulted on this point annually until conclusive results have been attained by him.

The pods of *Dalbergia latifolia* should be well dried and then broken up before sowing.

The fruits of *Pterocarpus marsupium* should be soaked in cow-dung mixed with water for 48 hours before sowing.

The whole fruit of *Artocarpus hirsuta* should be collected : the seeds should be removed from the fruit only just before sowing.

567. *Quantities of seeds required—Teak.*—One bag (38 lbs.) of seeds as collected, will yield about two-thirds of a bag of sound seeds, i.e., 25 lbs. At fifty seeds to the ounce, this would give 20,000 seeds. With a plant per cent of 50 the number of seedlings which should be available is 10,000. If 33 per cent of these become available for stumping, we should get 3,330 stumps. Two bags of seeds should thus provide enough stumps to plant five acres and a half at 6 feet × 6 feet. Allowing for replacement of casualties for two years at 50 per cent, about six bags of seeds as collected, should be ample for stocking ten acres.

Dalbergia latifolia.—One bag of 50 measures would suffice for sowing 8,000 patches at ten seeds per patch. At 400 patches per acre this would do for twenty acres.

Pterocarpus marsupium.—One bag of 50 measures would suffice for 2,500 patches at 10 seeds per patch. At 400 patches per acre this should do for six acres.

Artocarpus hirsuta.—About 40 seeds go to the ounce and a fruit yields on the average 10 seeds. Four pounds of seeds would yield 1,280 seedlings at a plant per cent of 50. If 50 per cent of these yield stumps, there would be enough for planting 400 patches per acre and leave over 200 for replacing casualties.

(c) *Nursery.*

568. Nurseries will be required for raising one year old teak stumps and one to three year old stumps of *Artocarpus hirsuta.*

569. *Teak.*—For the *Elival* and *Dhoni* series, the existing nursery sites will be retained until the beds show deterioration, when, as an experimental measure, they should be treated with leaf mould collected from the forest, instead of making new beds. If results be not satisfactory, fresh beds should be made.

In case any nursery beds are abandoned, seedlings must invariably be left on them at an approximate espacement of 6 feet × 6 feet, for subsequent development.

Suitable sites should be selected by the District Forest Officer for nurseries required for the Chindaki and Panakadan series. Sites may be found near Thadikundu and round the Thiruvazhamkunnu serambi. Detailed directions for the selection and formation of permanent nurseries will be found in the Madras Forest Pocket Book.

The existing practice of notching germinating teak seeds on to nursery beds is wasteful of seeds and space, and is costly : it should be replaced by the following method : Sound teak seeds are sown on the nursery bed by the middle of May, after the preliminary soaking prescribed above, so as to form a layer covering the bed completely and nearly touching one another. The seeds are then barely covered over with a layer of good soil, followed by a cover of scattered twigs (twigs of *Phyllanthus emblica* are recommended as they are long and whippy, with few side-branches, but any similar twigs should do) and finally by a fairly heavy mulch of damp straw on top, to promote germination. The twigs keep the straw from working into the soil and facilitate its removal on germination. The beds should be watered daily on top of the straw, until germination sets in, when the straw, and the twigs should be removed carefully. The bed should then be kept moist by watering, as necessary, until the monsoon has set in. Approximately 75 per cent may be expected to germinate, but the seedlings should be thinned out to about 3 inches apart. There is thus left sufficient space between seedlings to allow the growth of good-sized stumps without the necessity for pricking out. The method should prove cheap and efficient.

The number of stumps that could be reasonably expected from this method of nursery practice is 16 to a square foot, at a natural espacement of 3 inches × 3 inches. Hence to provide 1,800 stumps for planting and replacement of casualties over one acre, 112 square feet of beds are indicated : about 100 square feet would probably be found ample in practice.

570. *Artocarpus hirsuta.*—Nurseries for raising one to three year old stumps of *Artocarpus hirsuta* will be required for the Elival and Chindaki series.

Seeds should be dibbled in beds at an espacement of 3 inches × 3 inches for one year old stumps ; these can be thinned out for the production of two or three year olds. One bed 25 feet × 3 feet can accommodate 1,200 plants, out of which about 600 stumps may be expected. This should suffice for an acre, inclusive of replacements.

571. *Nursery Ledger.*—A record of the cost of each operation connected with a nursery should be maintained separately in a ledger under the various heads such as clearing site, making beds, seed collection, fencing, sowing, watering, manuring, weeding, remaking beds, and the like.

572. *Nursery costs.*—The current nursery costs for the production of teak stumps have varied from Rs. 3 to Rs. 13 an acre (1,200 stumps). The formation of a new nursery raises the cost for the year naturally, but even so with respect to the latter figure, there would seem to be scope for considerable economy. The method of nursery practice prescribed above, combined with careful supervision and frequent scrutiny of the nursery ledger, should reduce costs appreciably.

(*d*) *Cutting and burning.*

573. *Dhoni and Elival series.*—The material left on the ground is not likely to be sufficient for a good burn ; it will be advisable, therefore, to supplement it by cutting back the young coppice of the year. If sufficient material is available for a good burn over the whole area, no piling of slash in heaps will be necessary ; but if the material be insufficient, it should be heaped up in lines along which the teak will be subsequently planted, and then burnt thoroughly. The burning should be completed before the end of March.

In the Dhoni series, the coupes have been demarcated with the object of exploiting as much of the lower slopes as is advisable, for fuel. The result will be that the upper side of some of the coupes will not be suitable for teak planting. Such unsuitable areas and all rocky outcrops will be excluded from planting, and from all its attendant preliminary operations, after the coupe has been felled. Coppice growth should be allowed to grow up on them.

574. *Chindaki and Panakadan series.*—The coupes to be planted will be handed over to the respective kumridars by the first week of January, on their executing agreements as prescribed in paragraph 589 below. The kumridars will cut, pile up, and burn all slash before the end of March so as to avoid April showers, under departmental supervision, in order to be sure that the operation is properly done. No dearth of slash is anticipated. Too severe a burn concentrated on small areas is likely to result in baking the soil and to produce a condition not conducive to plant-growth : this should be guarded against. A good, not too intense burn, as even as possible over the whole area, should be aimed at.

(*e*) *Staking and soil preparation.*

575. *All series.*—The espacement will be 6 feet × 6 feet for all series.

The lining will be done as described in the Madras Forest Pocket Book.

Stakes three feet long should be driven firmly into the ground at every six feet.

576. *Elival and Dhoni series.*—Advantage should be taken of April showers to loosen the soil to a depth of six inches in an 18 inch square at each stake.

577. *Chindaki and Panakadan series.*—The kumridar will prepare the soil over the whole coupe.

Staking and soil preparation should be completed in all the four series by the end of April.

578. *Experimental soil-preparation.*—Since fresh areas are being brought under planting, no elaborate soil preparation beyond that prescribed above, is likely to be necessary. As an experimental measure, however, one acre in each of the coupes of Dhoni and Elival series, will be prepared as described below, for the first three years. The cost of this operation, and the consequent improvement in growth and saving in weeding, if any, will be weighed against each other at the end of this period ; if the results warrant it similar preparation of the soil will be extended over the whole coupe.

The sample area to be treated should be selected by the District Forest Officer or his gazetted assistant, so that it may represent a fair average of the coupe. At each stake within the area so selected, the soil should be dug up with a pick-axe to a depth of 1 foot and 18 inches square, all weeds and roots within the square being completely uprooted and removed. April showers should be taken advantage of in preparing the soil, which should be completed by the middle of May. The work should be closely supervised by a reliable subordinate and checked by the Range officer soon after completion, as it cannot be properly checked later.

(*f*) *Dibbling.*

579. *Elival and Chindaki series.*—In order to obtain the requisite mixture, *Dalbergia latifolia* and *Pterocarpus marsupium* will be dibbled, in the above two series ; *Artocarpus* will be mixed by stump-planting.

The seeds should be dibbled in the same patches where the teak is to be subsequently planted, but at one corner of the 18 inches square over which the soil has been prepared as prescribed in paragraphs 576 and 577.

The first line of stakes will be dibbled with seeds of *Dalbergia latifolia* and the second line with those of *Pterocarpus marsupium*; between the third and fourth lines will be planted stumps of *Artocarpus hirsuta* in quincunx. This arrangement will be repeated over the rest of the coupe. About ten seeds should be dibbled at each stake by the middle of May.

Further, more especially on laterite soils, *Swietenia macrophylla* will be introduced in mixture in quincunx instead of *Artocarpus hirsuta,* experimentally over approximately one acre annually for the first five years; if its growth is satisfactory, and borer attack can be controlled, the introduction of this species will be extended at the discretion of the District Forest Officer.

580. *Dhoni and Panakadan series.*—No dibbling is prescribed.

(*g*) *Planting.*

581. *All series.*—One year old teak stumps will be planted at each stake in all the four series.

582. *Elival and Chindaki series.*—One to three year old stumps of *Artocarpus hirsuta* will be planted in crowbar holes between every third and fourth line of teak as prescribed in paragraph 579 above.

583. *General.*—In preparing stumps for planting, an inch or less of stem and 9 inches of root should be retained: a longer root may have to be kept in some cases, in order to avoid cutting through the carroty portion . The plants should be stumped as soon as they are dug out of the beds, a sharp knife being used to prevent the bark separating from the cambium. All side roots should be cut off. Damaged stumps should be discarded.

The stumps will be counted and tied up in bundles containing a definite number, and transported in covered baskets to the planting site.

The following points should be attended to in planting stumps :—

1. The teak should be planted six inches from the corner of the 18 inch square opposite to that in which the *Dalbergia* and *Pterocarpus* seeds are dibbled; the *Artocarpus* should be planted in crowbar holes in between the third and fourth lines of teak.
2. The stumps should be planted exactly up to collum, in vertical holes.
3. The depth of the hole should be, as near as possible, equal to the length of the root.
4. The stump should be planted *firmly,* without leaving any air-space below or around the root; it should resist a reasonably hard pull.
5. Recent experiments indicate the desirability of completing stump-planting of teak as early in April as possible. The Provincial Silviculturist should be consulted as to the best time for a particular locality, but until definite results have been established, the planting will continue to be with the on—set of the south-west monsoon, and should be completed by the middle of June, under normal conditions.

(*h*) *Casualties.*

584. It is essential to realize that as full a stocking as possible must be obtained in the year of planting, and that a 95 per cent stocking with teak stumps is by no means unusual at the end of the first year. One hundred per cent must be aimed at.

Casualties, in all four series, should be replaced during the first monsoon, as they occur, till the end of September. Teak and *Artocarpus* should be replaced by stumps; other species by excess seedlings from the dibbled patches.

585. The necessity for replacing casualties in the second year should be exceptional. When necessary, solitary casualties should be replaced by stumps of *Artocarpus,* in preference to teak, as the latter is not likely to catch up the surrounding year-old teak. Groups may be replaced by *Artocarpus* or teak and small blanks due to swampiness, by notching germinating seeds of *Terminalia tomentosa.*

586. In April of the third year, an enumeration of survivals will be carried out over the coupe, giving the results separately for each species. The percentage of survivals will be entered in the Compartment History and a copy submitted to the Conservator of Forests

before the first of May. The orders of the Conservator should be obtained before any further replacement of casualties may be undertaken. Generally speaking there should be no necessity for it, nor would it ordinarily be worth doing.

(j) *Kumri cultivation.*

587. In the Chindaki and Panakadan series, teak will be grown in the midst of field crops, under the well-known system of 'kumri' cultivation.

Hillmen residing in the Attapadi valley and the large Mappilla population near the Panakadan reserve, have expressed their readiness to undertake the work. If, for any reason, the people are not willing to undertake the kumri operations on the terms prescribed below, all regeneration work will be done departmentally, as in the other series.

588. In allotting land for kumri in the Chindaki series, preference should be given to hillmen residing inside reserved forests.

589. The area to be regenerated will be handed over to the kumridar on his executing an agreement with the District Forest Officer, on the following terms :—

1. The area to be regenerated will be handed over to the kumridar by the first week of January, on the completion of the main felling and extraction.
2. The kumridar will cut all standing trees on it and burn the slash before the end of March, in the manner prescribed in paragraph 574 above, free of cost.
3. The kumridar will supply to the department whenever required, sufficient labour at the usual market rates (to be fixed beforehand) for all departmental operations in the area, such as lining, staking, dibbling, planting and replacement of casualties.
4. The kumridar shall prepare the soil over the patches to be planted, free of cost, along with the soil-preparation for his agricultural crop and in the same manner.
5. The kumridar will be permitted to cultivate the area for one year with any crop he wishes to raise. It is, however, apprehended that a crop of *Cajanus indicus* (tora dhall) might interfere with the teak since it grows to a height of five or six feet. Tying up branches of the dhall plants together, might be tried in order to reduce this interference ; but if not found satisfactory after a couple of years' trial, this crop will have to be prohibited.
6. The kumridar should keep the plants at each stake *clean weeded at all times*, to a radius of one foot round it, free of cost.
7. If the kumridar has perfomed his obligation to the satisfaction of the District Forest Officer, he will be entitled to take the agricultural crop he has raised in return for the free labour he has provided for felling and burning the area and keeping the plants well weeded.

590. The entire responsiblity for the proper execution of all the operations prescribed above shall rest with the District Forest Officer, who should satisfy himsels, from time to time, that the kumridar keeps to the terms of the agreement and does all that he has to do at the proper time. Unremitting but tactful supervision is essential for success, especially for the first few years.

SECTION 6.—SUBSIDIARY SILVICULTURAL OPERATIONS.

(a) *Weeding.*

591. The technique of weeding differs in various localities, but in all the elimination of root-competition is recognized as being essential. Scraping with a mamti, in lines two feet broad on both sides of the rows of teak, has been found very efficient. This method should be tried as soon as the plants develop sufficiently to make it safe and should be repeated as necessary. Continual touch must be kept with the Provincial Silviculturist, and methods of weeding changed in accordance with the results he gets from his experiments.

592. *Elival and Dhoni series.*—Past experience has shown that weeds are unusually heavy in these two localities.

Weeds should be uprooted in lines four feet wide, two feet on either side of the rows of teak. This first weeding should commence as early as necessary after the completion of planting. On the intermediate strips, the weeds should be cut with a knife, and those from the cleaned strips piled on top. Natural regeneration and regrowth of tree species other than teak shall be cut back cleanly at ground level, during weeding.

Lantana should be uprooted wherever found. Bamboo regrowth should be cut back as often and as soon as young shoots appear, so as eventually to kill the clump.

Weeding should progress in lines along the contour, the weeds being thrown in the middle of the strips running along the contour, so as to prevent soilwash during the monsoon.

Weeding as prescribed above should pass progressively and continuously over the whole area, until the end of October, unless the scraping recommended above is undertaken ; and three or four such weedings may be found necessary. If, however, scraping is undertaken, the plants will be sufficiently developed to stand it at the end of one or two such weedings, and no weeding in the first year is likely to be found necessary after the scraping. Scraping is best done by the end of August or the beginning of September.

Casualties noticed at the time of weeding should be replaced promptly.

Two or three weedings will be found necessary in the second year and probably none in the third, but it is left to the District Forest Officer, in consultation with the Conservator, to do what may be required in this respect.

593. *Chindaki and Panakadan series.*—In these two series, the plants will be kept continuously clean weeded by the kumridar, free of cost, for the first year.

In the second year, weeding will be done on the same lines as laid down above for the departmentally worked series. Casualties should be promptly replaced.

No weeding should be necessary in the third year but it is left to the District Forest Officer, in consultation with the Conservator, to do what may be required in this respect.

(*b*) *Pruning and Cutting back.*

594. In all series, seedlings damaged by borers (*Phassus*) wind or other causes, should be neatly and promptly cut back at ground level. Surplus shoots from stumps should be reduced to one. All forked stems and stout side-branches should be *carefully* pruned flush with the main stem, without tearing the bark round the cut : the necessity for extensive pruning is not likely to arise, however. These operations should be conducted along with the first weeding of the second year.

(*c*) *Cleanings and Thinnings.*

595. In the sixth year after formation, a combined cleaning and thinning of the plantations in all the felling series, should be undertaken, with the primary object of regulating the mixture of subsidiary or adventitious species in them. During the cleaning bamboos and climbers should be cut and any lantana uprooted. The operation of first thinning requires considerable skill and should be conducted by the District Forest Officer in person over appreciable areas. It should not be entrusted to any other than a gazetted officer or a ranger specially trained for the purpose.

596. *Elival and Chindaki series.*—Teak is the main species and must be favoured, but care must be taken to maintain the mixed character of the plantations. When necessary, branches of inferior species interfering with desirable stems may be lopped, but the tree must not be destroyed except under the implicit instructions of the District Forest Officer.

597. *Dhoni and Panakadan series.*—Owing to the fact that these series are to be worked on a short rotation, the artificial introduction of a mixture has not been prescribed, but the natural regeneration and regrowth of tree species should be allowed to grow up where they are not interfering with the teak, and their mixture regulated during this operation.

598. *Elival and Dhoni series.*—The old plantations of teak at Dhoni, Elival and Puliampalli tope, raised in 1918–20, will be thinned when they are 18 years old.

599. Thinnings in teak plantations are well understood and do not require detailed prescriptions ; the Madras Forest Pocket Book may be consulted for the standard practice. It should however be borne in mind that the tendency has been in the past to err on the side of making too light a thinning. In the Elival and Chindaki forests the aim should be to produce cylindrical trees of big girth, and to this end it may be necessary to sacrifice height growth. The Provincial Silviculturist is making experiments elsewhere on these lines, and should be periodically consulted.

600. No subsidiary silvicultural operations have been prescribed for any of the plantations after the second or third year of formation, until the cleanings and thinnings of the sixth year. If, however, the District Forest Officer considers that any cultural operation is necessary at any time in the intervening period, in the interests of the plantation, it may be undertaken after obtaining the sanction of the Conservator. Climber cutting, especially in the Dhoni and Elival series, may be found necessary.

(*d*) *Underwood.*

601. In some of the private teak plantations near Palghat, grown on short rotations, it is the practice to sell the undergrowth, which consists mainly of *Xylia*, once in five or six years. The slash left after the removal of the undergrowth, along with the fallen teak leaves, is burnt within the plantation the result being a light ground fire. This fire, combined with the wounding of the root consequent on extraction, appears to induce profuse regrowth and root-suckers from the *Xylia* stumps. The result has been a good underwood of *Xylia* in the plantation, without any apparent injury to the teak.

602. The presence of an underwood of *Xylia* in short rotation teak plantations, would increase the value of the coupes when they come to be sold in the twenty-sixth year, and further, it would be of value in maintaining the soil factors which may well be liable to deteriorate under the short rotation working, and reproduction from stools, contemplated. If an underwood of *Xylia* could be successfully established, it may even be possible to sell it twice in one rotation of the overwood. With these objects in view, the following experiments are prescribed :—

1. One representative acre of the plantation containing an appreciable mixture of *Xylia* regrowth, will be selected in the Dhoni series, in the year following formation. The root systems of all *Xylia* within the acre will be partly exposed with a pick axe and the roots wounded lightly, with a view to the production of root-suckers. Seeds of *Xylia* will be dibbled in patches in April-May, underneath natural regeneration other than *Xylia*, at ten seeds per patch, the espacement of the patches being approximately 3′ × 3′. Stakes 3′ high will be used to indicate the patches. The operation will be repeated over another acre of the same plantation in the second year after formation, and similarly in the third, fourth and fifth years.

2. One acre will be selected in a plantation of the Panakadan series, as in the first experiment, in the fifth year after formation. A fire will be run through the area in February or March, soon after the teak has shed its leaves and as soon as they are dry enough to burn. Seeds of *Xylia* will be dibbled in the area as in the first experiment. The operation will be repeated over the same area in the seventh and ninth years.

A careful report on the results of these experiments should be entered in the Compartment History.

The experimental areas should be demarcated by cut lines and sign boards. Due care should be taken to see that the fire in the second experiment is properly controlled and that it does not overspread its limits.

SECTION 7.—MISCELLANEOUS PRESCRIPTIONS.

(*a*) *Fire protection.*

603. All plantations should be protected against fire by cleared lines 20′ wide all round, the internal lines between plantations being limited to a width of 10 feet. Closed firelines, on which the undergrowth alone is cut and the trees retained, are advocated. These lines should be firetraced at the commencement of the fire season and kept clear of all inflammable material throughout the hot weather by sweeping and burning at intervals. Fire patrols will continue to be employed, as at present.

(*b*) *Inspection paths.*

604. The fire lines will also serve as inspection paths. A strip six feet wide between two rows of plants and running approximately in the middle along the contour throughout the length of the plantation, should be kept clear of all growth, to facilitate inspection.

(*c*) *Demarcation.*

605. In the Elival and Dhoni series, stone pillars should indicate the year of formation of the plantation. The pillars should be of ample dimensions, not less than 2½ feet high above ground level and 15 inches wide. If the existing pillars do not show the details correctly, they should be re-engraved to agree with this prescription. Pillars indicating the past coupes of the Fuel Working Circle should be removed as they are liable to cause confusion : they may be re-engraved and used for future demarcation, if suitable.

For Chindaki and Panakadan series, where stone is not readily available, sign boards, suitably engraved, and 18″ × 9″ in size, should be nailed on to trees retained along the coupe boundary for this purpose : teak boards are recommended.

(*d*) *Cost of formation.*

606. The cost of formation in the past has varied from Rs. 20 to Rs. 50 per acre, the higher figure being partly due to inclusion in the year of the full cost of formation of new nursery beds. The following is the estimated cost of formation in the different series :—

Operations,	Cost per acre.			
	Elival.	Dhoni.	Chindaki.	Panakadan.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
First year—				
Felling of unsaleable material	2 0 0	2 0 0	Done free by kumridars.	
Heaping and burning	2 0 0	2 0 0		
Collection of seeds other than teak and *Artocarpus*.	0 8 0	..	0 8 0	..
Collection of seeds and nursery cost for teak stumps.	5 8 0	5 8 0	5 8 0	5 8 0
Collection of seeds and nursery cost for *Artocarpus*.	2 0 0	..	2 0 0	..
Stakes and staking	2 8 0	2 8 0	2 8 0	2 8 0
Soil preparation	2 0 0	2 0 0	Done free by kumridars.	
Planting teak	..	3 0 0	..	3 0 0
Planting *Artocarpus*	3 8 0	..	3 8 0	..
Dibbling of auxiliary species	1 0 0	..	1 0 0	..
Replacing casualties	..	..	1 8 0	1 0 0
Weeding and replacing casualties	9 0 0	9 0 0	Done free by kumridars.	
Total ..	30 0 0	26 0 0	16 8 0	12 0 0
Second year—				
Replacing casualties, weeding, pruning, etc. ..	6 0 0	6 0 0	6 0 0	6 0 0
Total cost of formation at the end of the second year.	36 0 0	32 0 0	22 8 0	18 0 0

SECTION 8.—CONTROL.

607. The District Forest Officer is personally responsible for the correct posting of the following control records :—

1. *The Control Book.*—A sample form is given in Appendix II (*f*).

2. *The Record of Works.*—The form prescribed for the Selection Working Circle will suit.

3. *The Abstract of Annual Revenue and Expenditure.*—The form prescribed for the Selection Working Circle may be used.

4. *The Nursery Ledger.*—As prescribed in the Selection Working Circle.

5. *The Regeneration Ledger.*—This should be maintained separately for each coupe, as at present. A sample form is given in Appendix II (*h*).

6. *Compartment History.*—The form in which this should be maintained will be found in Appendix II (*j*). Descriptions of the compartments have been written up for existing plantations; their history should be kept up to date by annual entries. One book of bound forms will be maintained for each series and the control map should find place opposite the history.

7. *The Control Map.*—This should be on a scale of 8″ = 1 mile and should be prepared for each plantation and attached to its history. The area felled, the area regenerated with teak, the area left unplanted, swampy localities regenerated with *Terminalia tomentosa* areas on which regeneration has failed, burnt areas, and any other points of interest, will be accurately shown on the Control map. Differences in quality should also be entered when they manifest themselves distinctly—probably by the sixth year.

608. An annual statement of operations is furnished below.

Tabular statement of operations—Teak Conversion Working Circle.

Year.	Felling.			Regeneration.		Remarks.	Weeding.		Pruning and cutting back.		First thinning.		Second or subsequent thinning.	
	Locality.	Coupe number.	Area.	Locality	Area.		Locality.	Area.	Locality.	Area.	Locality.	Area.	Locality.	Area.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1932 ..	Elival, 1933 ..	VI	13·6	E. 1932	13·5	Actuals	E. 1931	55·0	E. 1931	55	..	..	..	..
	Dhoni, 1933 ..	V	32	D. 1932	19·0	Actuals' Nursery for Artocarpus.	D. 1931	19·5	D. 1931	19·5	..	..	..	..
	Chindaki, 1933 ..	..	..	..	..		E. 1932	13·5	..	..	..	..	..	..
	Panakadan, 1933 ..	..	..	..	..		D. 1932	19·0	..	..	..	..	..	..
1933 ..	Elival, 1934 ..	VII	13·2	E. 1933	13·6	* Unsuitable area not to be cut, burnt or planted. Nursery for teak and *Artocarpus*.	E. 1932	13·5	E. 1932	13·5	..	..	..	..
	Dhoni, 1934 ..	VI	28·5	D. 1933	32·0*		D. 1932	19·0	D. 1932	19	..	..	..	..
	Chindaki, 1934 ..	I	10	..	..		E. 1933	13·6	..	..	..	..	..	..
	Panakadan, 1934 ..	I	10	..	..		D. 1933	32·0	..	..	..	..	..	..
1934 ..	Elival, 1935 ..	VIII	13·2	E. 1934	13·2		E. 1933	13·6	E. 1933	13·6	E. 1928	21 + 5	..	..
	Dhoni, 1935 ..	VII	33	D. 1934	28·5	Do.	D. 1933	32	D. 1933	32	D. 1928	4·	..	..
	Chindaki, 1935 ..	II	10	C. 1934	10·0		E. 1934	13·2	..	..	..	..	..	..
	Panakadan, 1935 ..	II	10	P. 1934	10·0		D. 1934	28·5	..	..	..	..	..	..
1935 ..	Elival, 1936 ..	IX	15	E. 1935	13·2		E. 1934	13·2	E. 1934	13·2	E. 1929	13+32·5	..	..
	Dhoni, 1936 ..	VIII	30·5	D. 1935	33·0	Do.	D. 1934	28·5	D. 1934	28·5	D. 1929	22·	..	..
	Chindaki, 1936 ..	III	10	C. 1935	10·0		C. 1934	10	C. 1934	10·0	..	..	..	..
	Panakadan, 1936 ..	III	10	P. 1935	10·0		P. 1934	10	P. 1934	10·0	..	..	..	..
							E. 1935	13·2	..	..	..	..	..	..
							D. 1935	33	..	..	..	..	..	..
1936 ..	Elival, 1937 ..	X	14·5	E. 1936	15		E. 1935	13·2	E. 1935	13·2	E. 1930	35	..	..
	Dhoni, 1937 ..	IX	33·5	D. 1936	30·5	Do.	D. 1935	33	D. 1935	33	D. 1930	22·6	D. 1918	5·5
	Chindaki, 1937 ..	IV	10	C. 1936	10		C. 1935	10	C. 1935	10	..	..	..	..
	Panakadan, 1937 ..	IV	10	P. 1936	10		P. 1935	10	P. 1935	10	..	..	..	..
							E. 1936	15	..	..	..	..	..	..
							D. 1936	30·5	..	..	..	..	..	..
1937 ..	Elival, 1938 ..	XI	14·6	E. 1937	14·5	† Most of 4·5 acres of old teak plantation will require little planting.	E. 1936	15	E. 1936	15	E. 1931	55	D. 1919	13·75 + 20
	Dhoni, 1938 ..	X	30·0	D. 1937	30 †		D. 1936	30·5	D. 1936	30·5	D. 1931	19·5	E. 1919	8·75
	Chindaki, 1938 ..	V	10	C. 1937	10		C. 1936	10	C. 1936	10	..	..	..	..
	Panakadan, 1938 ..	V	10	P. 1937	10		P. 1936	10·0	P. 1936	10	..	..	..	..
							E. 1937	14·5	..	..	..	..	..	..
							D. 1937	33·5	..	..	..	..	..	..
1938 ..	Elival, 1939 ..	XII	13·5	E. 1938	14·6		E. 1937	14·5	E. 1937	14·5	E. 1932	13·5	..	..
	Dhoni, 1939 ..	XI	19 ‡	D. 1938	30	‡ In Dhoni reserve ..	D. 1937	30	D. 1937	33·5	D. 1932	19·0	..	..
	Chindaki, 1939 ..	VI	10	C. 1938	10		C. 1937	10	C. 1937	10	..	..	..	..
	Panakadan, 1939 ..	VI	10	P. 1938	10		P. 1937	10	P. 1937	10	..	..	..	..
							E. 1938	14·6	..	..	..	..	..	..
							D. 1938	30	..	..	..	..	..	..
1939 ..	Elival, 1940 ..	XIII	13·0	E. 1939	13·5		E. 1938	14·6	E. 1938	14·6	E. 1933	13·6	..	..
	Dhoni, 1940 ..	XII	38·0	D. 1939	19·0		D. 1938	30·0	D. 1938	30·0	D. 1933	32·0	..	..
	Chindaki, 1940 ..	VII	10·0	C. 1939	10·0		C. 1938	10·0	C. 1938	10·0	..	..	..	..
	Panakadan, 1940 ..	VII	10·0	P. 1939	10·0		P. 1938	10·0	P. 1938	10·0	..	..	..	..
							E. 1939	13·5	..	..	..	..	..	..
							D. 1939	19·0	..	..	..	..	..	..
1940 ..	Elival, 1941 ..	XIV	14·0	E. 1940	13·0		E. 1939	13·5	E. 1939	13·5	E. 1934	13·2	E. 1928	21 + 5
	Dhoni, 1941 ..	XIII	38·0	D. 1940	38·0		D. 1939	19·0	D. 1939	19·0	D. 1934	28·5	D. 1928	4
	Chindaki, 1941 ..	VIII	10·0	C. 1940	10		C. 1939	10	C. 1939	10·0	C. 1934	10	..	..
	Panakadan, 1941 ..	VIII	10·0	P. 1940	10		P. 1939	10	P. 1939	10·0	P. 1934	10	..	..
							E. 1940	13·0	..	..	..	..	..	..
							D. 1940	38	..	..	..	..	..	..
1941 ..	Elival, 1942 ..	XV	15·0	E. 1941	14·0		E. 1940	13·0	E. 1940	13·0	E. 1935	13·2	E. 1929	13 + 32·
	Dhoni, 1942 ..	XIV	31	D. 1941	38·0		D. 1940	38	D. 1940	38	D. 1935	33·0	D. 1929	2 2
	Chindaki, 1942 ..	IX	10	C. 1941	10		C. 1940	10	C. 1940	10	C. 1935	10·0	..	..
	Panakadan, 1942 ..	IX	10	P. 1941	10		P. 1940	10	P. 1940	10	P. 1935	10·0	..	..
							E. 1941	14	..	..	..	..	..	..
							D. 1941	38	..	..	..	..	..	..
1942 ..	Elival, 1943 ..	XVI	14·0	E. 1942	15		E. 1941	14	E. 1941	14	E. 1936	15	E. 1930	35
	Dhoni, 1943 ..	XV	33·0	D. 1942	25§	§ Old teak plantation poorly stocked.	D. 1941	38	D. 1941	38	D. 1936	30·5	D. 1930	22·6
	Chindaki, 1943 ..	X	10·0	C. 1942	10		C 1941	10	C. 1941	10	C. 1936	10	D. 1918	5·5
	Panakadan, 1943 ..	X	10·0	P. 1942	10		P. 1941	10	P. 1941	10	P. 1936	10	(Third thinning).	
							E. 1942	15	..	..	..	..	..	..
							D. 1942	31	..	..	..	..	..	..

CHAPTER IV.—WORKING PLAN FOR THE FUEL WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE WORKING CIRCLE AND CHARACTER OF THE VEGETATION.

609. *Area.*—This working circle is confined to one reserve—Thampurattipottai—of 130·4 acres. About a fifth of the area (29 acres) is sheet-rock leaving a balance of a hundred and one acres for exploitation.

610. *Vegetation.*—The locality supports a deciduous type of forest of poor quality, consisting chiefly of *Xylia xylocarpa*, *Terminalia paniculata*, *Anogeissus latifolia*, *Grewia tiliæfolia*, *Pterocarpus marsupium* and *Alibizzia sp.*, with thorny shrubs of *Zizyphus xylopyrus*, *Zizyphus œnoplia* and *Randia dumetorum*. A few natural teak of poor quality, the remains of 50 acres of teak plantations of 1919–20, now written off the Plantation Register, and a few poles of *Dalbergia latifolia*, are scattered over the area, along with a few sandal seedlings up to six years old.

Lantana is common but does not form impenetrable thickets.

The growth is mainly coppice, ten to twelve years old, about 25 feet in average height and 20 inches average girth, at breast height, the whole area having been worked under the coppice—with standards system in 1918–19 and 1919–20. A few standards of teak and rosewood of poor quality are scattered over the area.

The coppice shoots of *Pterocarpus marsupium*, *Terminalia paniculata* and *Grewia* show the highest diameter growth in the last ten years, some of the shoots of *Terminalia paniculata* showing as much as three feet girth at breast height.

An area of 8 acres of paddy fields was acquired and added to the reserve in 1920. Attempts appear to have been made to stock these fields with teak, *Terminalia tomentosa* and *Pterocarpus marsupium*. Some teak may still be found on the bunds, but *Pterocarpus marsupium* has attained marked success in one or two fields, where a fine crop of poles forms an almost complete canopy.

A few bamboo clumps occur in the neighbourhood of the tank situated at the head of the paddy fields.

SECTION 2.—BLOCKS AND COMPARTMENTS.

611. The reserve is so small that the whole of it will be considered to form one compartment.

SECTION 3.—ANALYSIS AND VALUATION OF THE CROP.

612. No valuation of the crop has been made as the area is small.

613. The total number of teak trees on the area was counted by the Range Officer, Palghat, and the results are tabulated below :—

Girth at breast height.	Number of trees.
2 to 3 feet	2
3 to 4 feet	2
4 to 5 feet	76
5 to 6 feet	11
6 to 7 feet	3
Total	94 trees, over 2 feet girth at breast height.

Summarise

SECTION 4.—METHOD OF TREATMENT.

614. *The Silvicultural system.*—The object of management is to obtain the highest annual sustained money yield that the forest is capable of providing without deterioration.

The growth on the area, which was then a five-year-old coppice, was sold in 1903 for Rs. 3,550 and in 1913–15, when about 11 years old, for Rs. 6,369 and again in 1919 for Rs. 2,691. Good prices have been obtained therefore for coppice-shoots five to ten years old. Girth measurements made in 1911 showed a mean annual girth increment of 2·2 inches per shoot ; measurements in 1931, of 2·1 inches. There has not been any appreciable depreciation, therefore, in spite of two later fellings. The rapidity of the growth in the locality, without deterioration due to repeated coppicing, and the good prices obtained for small fuel, point towards the " Simple Coppice " system for the attainment of the object of management.

The Simple Coppice System will therefore be adopted, natural reproduction from stools being relied upon.

615. *Exploitable size.*—Small fuel, in billets ranging from 6 to 12 inches in girth and faggotwood, 4 to 6 inches in girth, find a ready sale from the adjoining private forests. Fuel of 12 inches average girth will be grown, as it is bound to fetch good prices.

616. *Rotation.*—Billet-wood up to 12 inches in girth is being grown in private forests near Dhoni on a rotation of three to four years.

Girth measurements of 219 coppice shoots of various species, seven years old, were made in 1911, and they showed an average girth of 15·3 inches at breast height, as given in Chapter VI.

The poles of *Xylia xylocarpa* in the compound of the District Forest Officer's bungalow at Olavakkot, are, on the average, 12 to 18 inches in girth at breast height. There is evidence that these originated from the stools of poles felled in 1921; they are therefore ten years old.

The coppice shoots in the Thampurattipottai Reserve, which are ten to twelve years old, having resulted from the stools coppiced in 1918 to 1920, were measured and found to vary from 12 to 36 inches in girth at breast height, the average being 23·2 inches for 32 shoots of various species.

An average breast height girth of 12 inches may therefore be safely expected in seven years.

A rotation of seven years is therefore adopted.

617. *Yield.*—The yield will be regulated by area.

618. *Coupes.*—The non-rocky area of 101·4 acres (including the paddy fields on which there is at present no appreciable growth, but which are capable of being afforested) has been divided into seven coupes of approximately equal area, the rotation being seven years.

The coupes have been shown on the working plan map.

SECTION 5.—METHOD OF EXECUTING THE FELLINGS.

Summarise

619. (1) Before it is sold the annual coupe will be demarcated on the ground by cleared lines four feet wide, the felled material being thrown inside the coupe.

(2) The actual area as surveyed departmentally will be auctioned by the District Forest Officer in December and the lease will run only for five months, from the first of January to the end of May. With a rotation of seven years only, a difference in age of nearly twelve months between the growth in different parts of the same coupe is likely to be appreciable, and hence it is proposed to restrict the lease to five months. The area of each coupe is only 14 acres, approximately, and the period of the lease coincides with the season when agricultural work is slack, so that no difficulty is anticipated in regard to the availability of labour and the ability of the contractor to complete his work in the coupe, satisfactorily and without inconvenience, in the time allowed.

(3) All trees will be felled as close to the ground as possible; no stools higher than 6 inches above ground level must be left, and ordinarily the felling should be flush with the ground. The principle to be borne in mind is that it is required that the new shoots which spring from the stools should form new and separate roots of their own, so that there may be no question of the root systems becoming worn out and moribund, as is liable to happen when coppice shoots are allowed to grow from the top of a high stool.

With the short rotation prescribed this rule will be exceptionally easy of enforcement. The trimming and smoothing off of stools is not prescribed, but care must be exercised to see that the felling is done with a sharp instrument in the first instance.

(4) It is especially important that in no case must the contractor or the subordinate "re-coppice" stools after fellings have been completed for an appreciable time. This is often done to cover work, badly executed originally, when inspection by a superior officer is expected. The result is that the first vigorous growth of shoots is destroyed and much harm is done.

(5) All lantana should be uprooted by the contractor.

(6) The lease will be in accordance with the terms at present in use in the division, with such modifications as may be necessitated by the foregoing prescriptions.

(7) The bamboo clumps near the tank must be protected from clearfelling, and may be included in the lease of the coupe in which they are situated, subject to the conditions prescribed for bamboo fellings under the "Bamboo Working Circle."

SECTION 6.—REGENERATION.

620. *Species.*—No attempt will be made to regenerate, artificially, small gaps in the coupes, but unstocked paddy fields included in coupes I to VI will be regenerated with *Terminalia tomentosa, Eugenia jambolana* and *Lagerstrœmia flos-reginœ,* as available.

621. *Staking and soil preparation.*—As soon as the contractor has vacated the coupe, the blank paddy flats will be staked at an approximate espacement of 6′ × 6′, the soil dug up to a depth of one foot at each stake and heaped up into a mound 18 inches square and at least 9 inches high—the height should be sufficient to keep the mound clear of water during the south-west monsoon. The lower bunds of the flats should be sufficiently broken up to facilitate quick drainage.

622. *Collection of seed and subsequent treatment.*—Fruits of *Eugenia jambolana* may be collected from the ground, when they ripen and fall, the pulp removed and the seeds stored, preparatory to sowing.

Terminalia tomentosa fruits may be similarly collected from the ground in April or May. They should be dumped 4 inches high under shade, near the river, and watered every other day until germination takes place.

Seeds of *Lagerstrœmia flos-reginœ* may be obtained from the District Forest Officer, Nilambur.

623. *Dibbling and notching.*—Four or five seeds of *Eugenia jambolana* should be dibbled at each stake, the dibbling being completed before the break of the monsoon, if seeds are available in time. About a third of the number of mounds may be so dibbled.

Four to five seeds of *Lagerstrœmia flos-reginœ* should be dibbled in about the same number of mounds, similarly.

Four to five germinating seeds of *Terminalia tomentosa* may be notched out on each of the remaining mounds, on a rainy day, as soon as the monsoon has established itself. The exact mixture will be regulated by the District Forest Officer, according to the availability of the seeds of the different species prescribed and he may also try other species if he has reason to expect that they will do well.

SECTION 7.—SUBSIDIARY SILVICULTURAL OPERATIONS.

624. *Weeding.*—The growth of weeds in the paddy fields is not heavy and the area is small. The forest subordinates will therefore keep the plants well weeded. Two weedings may be necessary in the first and second years, and one in the third year. Lantana must be uprooted.

625. *Casualties.*—Any casualties should be replaced in the first year, during weeding, either from dumps or by excess seedlings from other mounds.

626. *Cleaning and climber-cutting.*—All coppice shoots and seedlings will be freed thoroughly from lantana, climbers, thorns and other interference, between October and December of the year of felling. Lantana must be uprooted.

All climbers in the coupe should be cut by subordinates in the fourth year after felling.

627. A table of fellings and silvicultural operations is given below.

Table of Fellings and other Silvicultural operations.

Year of operations.	Coupe No.	Area excluding sheet rock.	Blanks suitable for regeneration.	Net working area in first rotation.	Coppice fellings.		Regeneration.		Cleaning and climber cutting.		Weeding.	
					Coupe.	Area.	Coupe.	Area.	Coupe.	Area.	Coupe.	Area.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1933	I	14·45	0·2	14·25	I	14·25	I	0·2	I	14·25	I	0·2
1934	II	15·87	1·0	14·87	II	14·87	II	1·0	II	14·87	I	0·2
											II	1·0
1935	III	13·62	1·8	11·82	III	11·82	III	1·8	III	11·82	I	0·2
											II	1·0
											III	1·8
1936	IV	13·44	1·0	12·44	IV	12·44	IV	1·0	IV	12·44	II	1·0
											III	1·8
											IV	1·0
1937	V	13·87	1·9	11·97	V	11·97	V	1·9	V	11·97	III	1·8
									I	14·45	IV	1·0
											V	1·9
1938	VI	14·64	0·1	14·54	VI	14·54	VI	0·1	VI	14·54	IV	1·0
									II	15·87	V	1·9
											VI	0·1
1939	VII	15·11	0·0	15·11	VII	15·11	VII	..	VII	15·11	V	1·9
									III	13·62	VI	0·1
1940	I	14·45	..	..	I	14·45	..	..	I	14·45	VI	0·1
									IV	13·44	..	..
1941	II	15·87	..	..	II	15·87	..	..	II	15·87	..	..
									V	13·87	..	..
1942	III	13·67	..	..	III	13·62	..	..	III	13·62	..	..
									VI	14·64	..	..

SECTION 8.—CONTROL.

628. The Control Book, Record of Works and the Control Journal will be maintained.

Sample entries are given in Appendix II (*k*) for the first; the second is common to all the working circles; and the third is common to the whole working plan area and its maintenance is described in the Forest Code.

The District Forest Officer is personally responsible for the correct posting of all control forms.

CHAPTER V.—WORKING PLAN FOR THE TENDING WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE WORKING CIRCLE AND THE CHARACTER OF THE VEGETATION.

629. This working circle is confined to the "logged" areas of the Chenat Nair Reserve, shola, semi-shola and deciduous, in which the forests were practically destroyed by the intensive exploitation carried out on American lines between 1920 and 1929.

The total area in this working circle amounts to 8,299 acres, including about 187 acres of plantations of various species.

630. In the sholas of the Dhoni Valley the 'logging' was particularly heavy and at the close of the operations, only a few unsound and useless trees remained scattered over the area, most of the poles and advance-growth having been destroyed as a result of the logging methods employed or of wind damage following the sudden exposure. A heavy mass of weeds soon took possession of the ground, out of which emerged, in the course of three to five years, soft-wooded quick-growing species like *Macaranga roxburghii* and *indica' Trema orientalis, Leea sambucina, Croton sp.* and *Pterospermum rubiginosum.* Protected by this canopy, seedlings of the valuable shola species such as *Mesua ferrea, Palaquium ellipticum, Calophyllum sp.* and *Artocarpus integrifolia,* have gradually appeared on the ground.

Where the "logging" was not so heavy, a similar condition has developed in the larger gaps, while in part of the Elival area, worked only for sleepers, mainly of *Mesua,* natural regeneration of *Mesua ferrea, Palaquium ellipticum* and *Calophyllum sp.* continues to thrive or has come into being.

In this area, worked only for sleepers of *Mesua ferrea,* the natural regeneration of *Palaquium ellipticum* of all sizes up to poles is prolific, wherever some light had been admitted by nature or by illicit or unregulated fellings in the past. Masses of seedlings and saplings are waiting for overhead light in order to shoot up and grow.

In the "rigs" i.e., the long straight clearings hundreds of feet long and about 50 feet broad, along which the "sky-line" (rope way) which carried down the logs ran, the conditions are akin to those found in heavily logged areas.

631. In the semi-deciduous belts of the logged areas, natural regeneration of *Acrocarpus fraxinifolius, Chukrassia tabularis* and *Cedrela toona* has appeared in considerable quantities, being specially profuse along the 'rigs.'

632. In the Elival valley there is a patch of natural regeneration of *Hopea parviflora* and *Hopea wightiana,* about 536 acres in extent. The larger trees have been logged, leaving behind the poles and the advance growth. The regeneration has been partly damaged by a fierce fire that passed over the area in 1929, which killed off several saplings. The saplings and poles are in urgent need of overhead light in many cases.

633. Several plantations of *Artocarpus hirsuta* and *Hopea parviflora,* now three to seven years old, have been successfully raised in the semi-deciduous area, but at considerable cost.

In the deciduous zone, plantations of Mahogany (*Swietenia macrophylla*) and *Terminalia tomentosa* have been raised, which are now from three to ten years old.

Natural regeneration of *Xylia xylocarpa, Grewia tiliaefolia* and *Lagerstroemia lanceolata* is fair throughout this area.

634. Climbers are a serious menace to natural and artificial regeneration, especially in parts of the deciduous and semi-deciduous forest.

635. This working circle includes that portion of the Teak Conversion Working Circle remaining unconverted, but which will not come up for regeneration within the next ten years as well as the Bamboo Working Circle.

SECTION 2.—DIVISION OF THE AREA.

636. The area is divided into the following compartments and sub-compartments :—

Compartment and sub-compartment.	Area in acres.		Type of forest.
	Total.	Net (deducting blanks).	
32	1,726	1,726	Deciduous.
33	288	288	Evergreen.
33 (*a*)	1,417	1,321	Deciduous.
34	162	162	Evergreen.
34 (*a*)	308	308	Deciduous.
35	281	281	Evergreen.
35 (*a*)	556	556	Deciduous.
36	320	320	Evergreen.
36 (*a*)	485	485	Deciduous.
37	217	204	Evergreen.
37 (*a*)	584	534	Deciduous.
38	255	255	Evergreen.
38 (*a*)	787	740	Deciduous.
39	176	123	Evergreen.
39 (*a*)	737	704	Deciduous.
Total	**8,299**	**8,007**	

637. The artificially regenerated areas fall naturally into plantations under the respective year of their formation :—

Name of plantation.	Species planted.	Year of formation.	Area in acres.	Cost of formation.
				RS.
1 Creeper plot	*Terminalia tomentosa* and *Swietenia macrophylla.*	1923 to 1926.	15·0	1,219
2 Elival Coupe II	*Artocarpus hirsuta*	1923–27	8·8	253
3 Fischer's burn	*Artocarpus hirsuta, Hopea* and *Terminalia tomentosa.*	1923–27	9·0	102
4 Hopea Medium	*Hopea parviflora*	1924–25	7·5	331
5 Hopea 1925–26	Do.	1925–26	21·0	329
6 Hopea 1926–27	Do.	1926–27	24·0	399
7 Mahogany I	*Swietenia macrophylla*	1919	0·5	Not known.
8 Do. II	Do.	1921–22	15·0	956
9 Do. III	Do.	1922–23	10·5	Not known.
10 Do. IV	Do.	1924–25	7·0	799
11 Do. V	Do.	1925–26	14·0	141
12 Do. VI	Do.	1926–27	50·0	932
13 Do. VII	Do.	1927–28	3·4*	476
14 Terminalia tementosa	*Terminalia tomentosa*	1923–26	1·0	

* 20 acres originally planted. Clearfelled and planted with teak in 1929. Balance 3·4 acres shown.

638. The areas of natural regeneration are :—

1. The Elival *Hopea.*—536 acres.
2. The Dhoni-Puliampalli Valley (Miscellaneous).—3,901 acres [Compartments 32, 33, 34, 33 (*a*) and 34 (*a*)].
3. The Sappal Valley (Miscellaneous).—1,642 acres [Compartments 35, 36, 35 (*a*) and 36 (*a*)].
4. The Elival Valley (Miscellaneous).—2,756 acres [Compartments 37,38, 39, 37 (*a*), 38 (*a*)- and 39 (*a*)].

639. The various areas are grouped under the following six " Tending Series " :—

(1) *The Hopea, Artocarpus* and *Mahogany Plantations.*—All plantations of *Hopea parviflora, Artocarpus hirsuta* and *Swietenia macrophylla* are included in this series, as it is proposed to tend them all in a similar manner.

The total area under this series is 170 acres, which includes all the plantations tabulated above with the exception of the *Terminalia tomentosa* plantations, numbers 1 and 13.

(2) *The Terminalia tomentosa plantations.*—These require a different treatment from the first, and have therefore been formed into a separate series.

The series includes the Creeper plot and the *Terminalia tomentosa* near the seasoning tank, with a total area of 16 acres.

(3) *The Elival Natural Hopea.*—This patch of natural regeneration of *Hopea* is 536 acres in extent.

(4) *Shola and semi-shola, not intensively "logged."*—These types extend over an area of 648 acres. (Compartments 37 and 38).

(5) *Heavily logged shola.*—Area 1,051 acres. (Compartments 33 to 36.)

(6) *The Deciduous forest.*—This includes the intensively logged areas and the area worked heavily for *Xylia* sleepers in 1929–30. It consists of compartments 32, 33a, 34a, 35a, 36a, 37a, 38a and 39a, aggregating 6,600 acres.

SECTION 3.—METHOD OF TREATMENT.

640. The working circle has been formed in order to prescribe the tending of the regeneration on areas felled under American "logging" methods, not guided by any recognized silvicultural system and of the various existing plantations of *Hopea, Artocarpus, Swietenia macrophylla* and *Terminalia tomentosa.* Only subsidiary silvicultural operations can therefore be prescribed.

Subsidiary Silvicultural Regulations.

641. *Hopea and Artocarpus plantations.*—Past operations in all except number 4 of the table given above, were confined to keeping the plants free from being smothered by climbers and the surrounding vegetation, and has not aimed at letting in overhead light to any appreciable degree.

It is prescribed that the future tending should aim at letting through sufficient overhead light to stimulate growth, but that the opening should be gradual so that no climbers or weeds be encouraged to grow up and swamp the plants.

The undergrowth and the overhanging branches preventing the access of overhead light, will be cut every year, for a period of five years, the openings being made larger year after year if the results of the previous operations indicate the advisability.

The work will be closely directed by the District Forest Officer, and should be carried out in the months of May and October, twice in a year.

The *Acrocarpus* in "Fischer's burn" requires little attention.

It is anticipated that at the end of this period the plants will have outgrown their nurses. If not, the tending will be continued, with the previous sanction of the Conservator, until it is no longer necessary.

642. In plantation No.4, where the removal of all the trees on the area has resulted in a mass of climbers which infest the young saplings, the tending will be limited to climber-cutting, and keeping the saplings free from the strangling climbers.

643. It is prescribed that during the balance of the period of this plan, climbers shall be cut every third year over these plantations.

644. *Mahogany plantations.*—The plantations of Mahogany (*Swietenia macrophylla*) will be tended in the same manner as has been prescribed for the *Hopea* and *Artocarpus* plantations, except plantation Nos. 7 and 10 in which overhead cover has been completely removed already.

645. It has been observed that too drastic a removal of the overhead shade encourages the shoot borer referred to in paragraph 164 of Chapter II. This borer is most injurious as it causes forking and abnormality, which will result in serious financial loss when the timber comes to be marketed. Care must therefore be exercised in making every endeavour to combat its attack. Opening of the upper canopy must therefore be gradual, the results of the operations of previous years being used as a guide, and the Provincial Silviculturist's advice sought as frequently as may be necessary.

646. It is anticipated that, at the end of the five years for which this tending is prescribed, the plants will require no further attention. In case further tending is considered necessary, the previous sanction of the Conservator should be obtained.

647. Plantations Nos. 7 and 10 are likely to require thinning during the currency of this plan. The thinning may be executed when the District Forest Officer considers it necessary.

648. It is also prescribed that during the balance of the period of this plan, climbers shall be cut every third year, over these plantations.

649. *Terminalia tomentosa plantations.*—These are six to nine years old now. They require to be thinned. A thinning is therefore prescribed in 1933. During the balance of the period of this plan, climbers shall be cut every third year.

650. *The Elival Natural Hopea.*—The saplings and poles of *Hopea parviflora* on this area are in urgent need of tending.

The total area of 536 acres over which *Hopea* prevails has been divided into three parts—A, 242 acres; B, 140 acres; and C, 154 acres in extent. One part will be tended in a year, the whole area being completed in three years.

During the rest of the period of the plan, the whole of this area will come under climber-cutting along with the rest of the Tending Working Circle, and no other tending is prescribed.

651. The following operations will be carried out during tending :—

(1) All climbers will be cut.

(2) Inferior species interfering with promising advance-growth and poles of *Hopea* will be removed ; those up to six inches in diameter will be felled ; bigger sizes will be girdled, if belonging to species which die by girdling, but felled, if otherwise. Complete *overhead* light will be aimed at.

(3) Natural regeneration of valuable evergreen and semi-evergreen species, such as *Acrocarpus fraxinifolius, Chukrassia tabularis, Cedrela toona, Calophyllum elatum, Mesua ferrea* and *Palaquium ellipticum*, occurring inside the *Hopea* area will be tended in the manner prescribed below for such regeneration, in lightly worked evergreen and semi-evergreen types, but provided that such tending is not prejudicial to the growth of promising advance growth of *Hopea*.

Shola and semi-shola not intensively logged.

652. All the evergreen and semi-evergreen areas, totalling 648 acres, to the east of Vandipara ridge (Ambalamalai) fall under this category.

In the semi-evergreens of this type there is an appreciable degree of the natural regeneration of *Acrocarpus fraxinifolius, Bischofia javanica, Chukrassia tabularis, Lagerstromia lanceolata* and *Cedrela toona*, along roads, paths and " rigs " and other open places where plenty of light reaches the ground. The *Acrocarpus* and the *Chukrassia* often extend into the true shola in places where plenty of light is available.

In the gaps created in sholas by old unregulated fellings or windfalls, advance growth and poles of *Palaquium ellipticum* often prevail.

In the gaps created by " logging " and by fellings for railway sleepers, unestablished and established regeneration of *Palaquium ellipticum, Mesua ferrea* and *Calophyllum elatum* are not uncommon.

All the regeneration mentioned above is often overgrown by an undergrowth of weeds, including *Strobilanthes.* Thorny climbers such as *Acacia intsia* and *Caesalpinia mimosoides*, soft wooded quick growing species like *Trema orientalis, Leea sambucina, Macaranga roxburghii* and *Pterospermum rubiginosum*, are a serious menace particularly in the semi-evergreens, where they suppress and kill out the natural regeneration of light demanders like *Acrocarpus, Chukrassia* and *Lagerstroemia.*

The total area under this type is 648 acres. This has been divided into five parts, 105, 112, 141, 114 and 176 acres in extent, each of which will be tended in a year, so that the whole area will be completed in five years.

653. The following prescriptions for the tending of this type should be considered as tentative and subject to such modifications as may be indicated by the results of these operations and by the experience gained on similar work in other parts of the province. The Provincial Silviculturist should be consulted as often as necessary :—

(1) Climbers should be cut wherever found,

(2) Seedlings of *Acrocarpus, Chukrassia, Lagerstroemia* and *Cedrela toona* would appear to require full overhead light from the start. They should therefore be tended by freeing their heads from all interfering inferior species. Clean weeding round young seedlings of *Acrocarpus* is not recommended as the species is shallow-rooted and is liable to be adversely affected by the resulting soil-dessication.

(3) The advance-growth and saplings of the valuable shola species occurring in gaps, such as *Palaquium ellipticum* and *Mesua ferrea*, should be tended by the judicious removal of the overhanging branches of soft-wooded species like *Macaranga roxburghii*, wherever required, so as to afford them direct overhead light and keep their heads free, without unduly opening up the forest floor to dessicating influences. Middle story trees up ta 6 inches in diameter, standing over such advance growth and saplings, may also be judiciously felled, where required, with the same object.

(4) Unestablished and established regeneration of the valuable species mentioned above, occurring in gaps, will be tended by the judicious removal of the undergrowth, including *Strobilanthes*, standing over them. *Strobilanthes* will be cut below the nodes from which stilt roots run into the soil.

(5) Poles need not be attended to.

654. During the balance of the period of this plan climber cutting should be done every year over one coupe, in rotation.

Heavily logged shola.

655. No tending of the natural regeneration in these areas is prescribed as the vegetation has retrogressed to such an extent that simple tending operations are not likely to restore the conditions suited to the original crop.

The Provincial Silviculturist should be consulted as to the possibility of undertaking experiments to determine the best way of tending the natural regeneration over such areas.

The Deciduous forest.

656. Part of this type of forest has been heavily logged as in the Elival valley, but certain areas have only been intensively worked for Railway sleepers, as in the Puliampalli and Dhoni valleys. Climbers are a serious menace in the former but are comparatively scarce in the latter. The Dhoni–Puliampalli and the Sappal valleys, totalling 4,492 acres, will therefore be excluded from tending for the period of this plan.

657. The terai portion of this type in the Elival valley, suitable for planting with teak, has been included in the Teak Conversion Working Circle and the areas which are included in the 10 years' planting programme prescribed in this working circle need not be tended.

658. The area has been divided into five parts.

It is prescribed that climbers should be cut over one part every year, on a rotation of five years.

The areas of these coupes are—

Coupe I, 181 acres.
Coupe II, 403 acres.
Coupe III, 484 acres.
Coupe IV, 519 acres.
Coupe V, 521 acres.

659. A tabular statement of operations in this working circle is appended.

Statement of operations in the Tending Working Circle.

Year.	*Hopea, Artocarpus* plantations.		Mahogany plantations.		*Terminalia tomentosa* plantations.		Elival natural Hopea.		Shola and semishola not intensively logged.		Deciduous forests.	
	Nature of work and coupe number.	Area in acres.	Nature of work and coupe number.	Area in acres.	Nature of work and coupe number.	Area in acres.	Nature of work and coupe number.	Area in acres.	Nature of work and coupe number.	Area in acres.	Nature of work and coupe number.	Area in acres.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1933–34	Tending all plantations.	70·3	Tending all plantations.	100·4	Thinning and pruning all plantations.	16	Tending Coupe A.	242	Tending Coupe I.	105	Climber cutting Coupe I.	181
1934–35	Do. ..	70·3	Do. ..	100·4	..	..	Tending Coupe B.	140	Tending Coupe II.	112	Climber cutting Coupe II.	403
1935–36	Do. ..	70·3	Do. ..	100·4	..	..	Tending Coupe C.	154	Tending Coupe III.	141	Climber cutting Coupe III.	484
1936–37	Do. ..	70·3	Do. ..	100·4	Climber cutting all plantations.	16	Tending with Coupe IV of column 10.	..	Tending Coupe IV.	114	Climber cutting Coupe IV.	519
1937–38	Do. ..	70·3	Do. ..	100·4	..	..	Tending with Coupe V of column 10.	..	Tending Coupe V.	176	Climber cutting Coupe V.	521
1938–39	..	..	..	..	..	..	Climber cutting along with operations in column 10.	..	Climber cutting Coupe I.	105	Climber cutting Coupe I.	181
1939–40	..	..	..	..	Climber cutting all plantations.	16	Do.	..	Climber cutting Coupe II.	112	Climber cutting Coupe II.	403
1940–41	Climber cutting all plantations.	70·3	Climber cutting. all plantations.	100·4	..	..	Do.	..	Climber cutting Coupe III.	141	Climber cutting Coupe III.	484
1941–42	..	..	..	..	..	..	Do.	..	Climber cutting Coupe IV.	114	Climber cutting Coupe IV.	519
1942–43	..	..	..	..	Climber cutting all plantations.	16	Do.	..	Climber cutting Coupe V.	176	Climber cutting Coupe V.	521

SECTION 4.—CONTROL.

660. The following Control Records will be maintained :—

(1) The Record of Works.

(2) The Compartment History. (*Vide* instructions contained under the Teak Conversion Working Circle.)

CHAPTER VI.—WORKING PLAN FOR THE BAMBOO WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE CIRCLE AND CHARACTER OF THE VEGETATION.

661. This working circle includes all the bamboo bearing areas of the Chenat Nair Reserve.

Bamboo does not occur all over the reserve. It is confined to the deciduous zone of the Sappal and Elival valleys, which are to the east of the Sappal ridge, and to the deciduous portion of the Kalladikode valley, in the north-west corner. There is no bamboo on the southern slopes to the west of the Sappal ridge.

Both *Dendrocalamus strictus* and *Bambusa arundinacea* occur.

The bamboos of the Elival valley have been flowering sporadically for the last three years, and a general gregarious flowering may be expected at any time, in the near future.

SECTION 2.—DIVISION OF THE AREA.

662. The bamboo bearing area has been divided into three coupes, as shewn on the map.

Two of the coupes lie adjacent to each other, to the east of the Sappal ridge : the third is in the Kalladikode valley.

Extraction and transport facilities and ease of control have been duly considered in fixing the boundaries of the coupes. Past bamboo fellings have influenced the order in which the coupes are proposed for future working.

The areas of the coupes are :—

	ACS.
Coupe I	1,619
Coupe II	842
Coupe III	1,578
Total ..	4,039

SECTION 3.—ANALYSIS AND VALUATION OF THE CROP.

663. Bamboo is fairly well distributed over the whole of Coupes I and III. The crop is more scattered over Coupe II, which is less valuable, both on account of poorer stocking and the greater lead to the market—Olavakot.

SECTION 4.—ROTATION AND THE METHOD OF TREATMENT.

664. The rotation will be three years.

The right to cut bamboos over one of the three coupes will be auctioned annually; the lease should run from January to December.

665. The following felling rules should be inserted in the usual form of agreement with the lessee : the first rule has been recommended by the Provincial Silviculturist, it is based on the result of experiment in Vellore ; there are indications that the best method of working bamboos is to remove half of the culms which are more than one year old ; to do this evenly throughout the clump is not practicable ; the method prescribed below is a sound compromise and should be tried experimentally for three years :—

(1) The contractor shall cut and remove all culms in the $\frac{\text{northern}}{\text{southern}}$ half of every clump, whether they be dead or living, except those which are one year old or less ; but shall leave the $\frac{\text{southern}}{\text{northern}}$ half of every clump entirely untouched.

(2) A clump which has flowered may be completely clearfelled.

Note.—If the northern half of a clump is felled in the first rotation, the southern half should be left untouched, but will be felled in the second rotation, and thus alternately thereafter. The necessary alteration may be made in the agreement by scoring out the words 'northern' or 'southern' as the case may be, in the proper places.

SECTION 5.—TABULAR STATEMENT OF FELLINGS.

666. A tabular statement of fellings is given below :—

Year.	Coupe.	Area in acres.	Year.	Coupe.	Area in acres.
1931	I	1,619	1937	I	1,619
1932	II	842	1938	II	842
1933	III	1,578	1939	III	1,578
1934	I	1,619	1940	I	1,619
1935	II	842	1941	II	842
1936	III	1,578	1942	III	1,578

SECTION 6.—CONTROL.

667. The Control Book should be maintained in the form shown in Appendix II (l) for the Minor Produce Working Circle. No separate book need be maintained for this working circle.

CHAPTER VII.—WORKING PLAN FOR THE MINOR FOREST PRODUCE WORKING CIRCLE.

SECTION 1.—GENERAL CONSTITUTION OF THE WORKING CIRCLE AND CHARACTER OF THE VEGETATION.

668. The Minor Produce Working Circle covers the whole area under this plan, with the exception of Bolampatty Block II situated in the Bolampatty Range. The minor produce in Bolampatty Block II may be leased as at present, under the prescriptions of the Bolampatty Working Plan.

The vegetation has been described in sufficient detail in Chapter II.

SECTION 2.—DIVISION OF THE AREA AND ANALYSIS OF THE CROP.

669. The area is divided into the following blocks to facilitate management :—

(1) The Silent Valley,
(2) Attapadi Blocks I to V and Panakadan reserve,
(3) Kottanikunnu reserve,

all three blocks in the Mannarghat Range ;

(4) The Chenat Nair, Dhoni, Puliampalli tope and Thampurattipottai reserves, and
(5) Attapadi Block VI,

both in the proposed Palghat Range.

670. *The Silent Valley.*—The important produce from this area are :—Cardamoms, cane, honey and wax.

The cardamom plant is regenerating naturally in the gaps created by selection fellings and requires to be tended with a view to increased crop-production.

Canes are being removed by the dragging coolies for dragging sleepers and kolmarams, so that the revenue from this source is likely to fall in the near future.

Rain-forests are on the whole less productive of honey than deciduous forests ; the quantity available from the area is not of sufficient value to incur the risk of fire in the enclosed grasslands and the consequent damage to the shola margins.

671. *Attapadi Blocks I to V and Panakadan reserves.*—Large areas of deciduous and semi-deciduous forests are included in this block. The chief kinds of minor produce available are :—Sheekai (pods of *Acacia concinna*), cardamoms, canes, honey and wax.

672. *Kottanikunnu Reserve.*—The chief stand on this small reserve consists of *Schleichera trijuga*. Experiments by Mr. M. A. Hafiz on the cultivation of lac on this species have met with considerable success.

673. *The Chenat Nair and surrounding minor reserves.*—The growth is partly deciduous and partly shola. The important minor products are :—Plaintain leaves, reeds (*Ochlandra*), fodder-grass, sheekai, cardamoms and wild pepper.

674. *Attapadi Block VI.*—The minor products available are :—Cardamoms, honey and wax and the fruits of *Vateria macrocarpa* from which last a useful vegetable fat may be extracted.

SECTION 3.—EXPLOITATION.

675. The right to collect minor forest produce from the undermentioned blocks will be leased out annually by public auction, each block being sold separately. The following produce will be sold :—

(1) Cardamom,
(2) Pepper,
(3) Wax,
(4) Honey,
(5) Mattippal,
(6) Turmeric,
(7) Sheekai,
(8) Ginger,
(9) Plantain leaves,
(10) Galnuts,
(11) Soapnuts,
(12) Tamarind,
(13) Nellikai,
(14) Thippili,
(15) Vembadam bark,
(16) Sambhur horns,
(17) Pungam seeds,
(18) Iluppai seeds,
(19) Arrow roots,
(20) Earth Kungiliam,
(21) Black dammer,
(22) Saya seeds,
(23) Stone moss.

Reeds (*Ochlandra*) and fodder grass from the Chenat Nair Block, will be sold separately, as prescribed below. If a demand arises elsewhere they may be sold likewise.

The blocks are :—

(1) Attapadi Blocks I to V and Panakadan reserves,
(2) Attapadi Block VI,
(3) The Chenat Nair, Dhoni, Puliampalli tope and Thampurattipottai reserves.

The conditions of the lease may be the same as are in force at present.

676. Reeds from the Chenat Nair Reserve have been sold for the last 4 years on headload tickets, at an anna per headload. Attempts at leasing out the right to collect reeds by public auction, have not met with success. The present practice will therefore be continued, until a satisfactory lease can be effected. The revenue from this source was Rs. 475 during the period.

Illicit removal of fodder grass from the Chenat Nair Reserve is fairly common, though headload tickets at three pies each can be bought from the Range Officer. Better facility for the purchase of these tickets should be provided by sales through the permit-issuing officer who is at present entrusted with tickets for reeds.

677. *The Silent Valley.*—The gaps caused by the selection feelings in the Silent valley are being invaded naturally by the cardamom plant and a considerable and increasing revenue may be expected from this source when the young plants commence bearing in about five years. The almost annual fires that grass lands within this reserve are subject to have been attributed to the coolies employed by the contractor for the collection of minor produce. The minor produce in the Silent valley will therefore be collected departmentally in order to prevent the fires referred to and also that the department may be in a position to form a correct estimate of the quantity and value of cardamoms available from the sholas, as a result of the spread of this crop due to selection fellings.

The produce collected may be sold by the District Forest Officer in whatever manner he deems fit.

SECTION 4.—REGENERATION OF CARDAMOMS.

678. Young plants of *Elettaria cardamomum* make their appearance naturally in many of the gaps caused by the fellings, whenever old plants exist in the vicinity.

Such of the gaps as have not been so invaded by the commencement of the second year's tending operations in any coupe, will be planted with young cardamom plants at an approximate espacement of 6 feet × 6 feet, if naturally grown young plants are available within a reasonable distance.

In gaps artificially regenerated, the planting should be in the strip left unregenerated round the periphery.

In the unregenerated gaps, the planting may be done throughout the gap.

In selecting natural seedlings for transplantation, young plants should be selected from congested groups, with the object of relieving such congestion and thus stimulating crop-production.

Seedlings should be dug out with a portion of the attached root-stock, and transplanted with it. A substantial stake 3 feet high should indicate every such transplant

Planting should be competed in the months of June to September of the second year's tending of the coupe.

679. The amount spent on the operations prescribed for the regeneration of cardamoms should not be excessive but should be restricted to a reasonable figure every year—say not more than an anna for every gap regenerated.

SECTION 5.—EXPERIMENTAL LAC CULTIVATION.

680. The Forest Utilization Officer reports that the experiments undertaken in the Kottanikunnu (Panakadan Extension II) Reserve, with a view to finding out if lac could be successfully grown on the west coast, on *Schleichera trijuga* trees, have met with considerable success.

The experiments will be continued until 4 or 5 successive crops have been raised in the locality, and the effects of the local climatic conditions will be noted carefully. No definite conclusions can be drawn until then.

SECTION 6.—CONTROL.

681. The Control Book and the Record of Works should be maintained in the forms given in Appendices II (1) and II (b) where sample entries will be found.

The Bamboo Working Circle will be controlled by the same book.

A table of operations is appended.

Statement of operations in the Minor Forest Produce Working Circle.

Year.	Planting of cardamom.		Year.	Planting of cardamom.	
	Coupe.	Net area suitable for cardamoms, in acres.		Coupe.	Net area suitable for cardamoms, in acres.
1933–34	S.V. C. IV	1,223	1939–40	S.V. C. X	375
	Att. C. II	1,143		Att. C. VIII	418
1934–35	S.V. C. V	1,285	1940–41	S.V. C. XI	930
	Att. C. III	591		Att. C. IX	960
1935–36	S.V. C. VI	427	1941–42	S.V. C. XII	691
	Att. C. IV	628		Att. C. X	1,953
1936–37	S.V. C. VII	1,648	1942–43	S.V. C. XIII	806
	Att. C. V	1,351		Att. C. XI	802
1937–38	S.V. C. VIII	668	1943–44	S.V. C. XIV	715
	Att. C. VI	1,338		Att. C. XII	1,902
1938–39	S.V. C. IX	497	1944–45	S.V. C. XV	304
	Att. C. VII	911		Att. C. XIII	1,790

S.V. = Silent Valley. Att. = Attapadi.

CHAPTER VIII.—WORKING PLAN FOR THE PROTECTION WORKING CIRCLE.

682. *Area and distribution.*—The total area of this working circle is 49,627 acres, distributed as shown in paragraph 432 above.

683. *Prescriptions.*—Of this area, 42,133 acres of High-level shola, rocky precipitous slopes and grass land, will be protected in perpertuity, as they are purely climatic forests, with no exploitable trees.

An area of 4,330 acres in the Attapadi Blocks I to VI was kumried by hill tribes prior to reservation. The remoteness of this area and the comparatively valueless crop it bears prevent its economic exploitation in the near future. This area will be protected until such time as improved communications and high prices enable us to work it at a profit.

An area of 2,738 acres of forests in Attapadi Blocks II, IV and V kumried before reservation lies on the eastern slopes adjoining the Attapadi plateau, across which produce may be carted to the Coimbatore district. The present stand on the area is too small in girth to be exploited for some years to come, being coppice regrowth from stumps of trees felled for kumri. This area will be protected during the period of this plan, and the position reviewed at the time of its revision.

An area of 208 acres in the Silent valley reserve and of 218 acres in the Chenat Nair Reserve will be permanently preserved as types of virgin shola.

The area of this working circle is included in the Minor Forest Produce Working Circle : collection of minor produce from it will therefore be permitted.

CHAPTER IX.—MISCELLANEOUS REGULATIONS.

SECTION 1.—FIRE PROTECTION.

684. *Chenat Nair and Dhoni Reserved Forests.*—The existing practice of the annual firetracing of reserve boundaries may continue, but the northern and eastern boundaries, where they adjoin the Karimpuzha, need no firetracing in future ; nor does that portion of the northern boundary lying above the Sappal-Muthikulam path, since it passes through shola on both sides. The triennial clearing of such lines has been prescribed in paragraph 706 below. The width of the firelines should be limited to the actual width of the boundary.

The fire protection of teak plantations within the reserves has been prescribed in Chapter III, Part II.

685. *Thampurattipottai and Puliampalli tope Reserved Forests.*—The subordinates will continue to early burn the boundaries, as at present.

686. *Attapadi Block VI.*—The eastern boundary is being firetraced as part of Bolampatty Block II. This should continue. It is also necessary to fireprotect the north-east corner, as it is subject to fires from the adjoining Attapadi Rubber Estate. The boundary from the Muthikulam-Attapadi Estate footpath as far east as Thumbemudi, should be firetraced to the existing width ; the length is estimated to be three miles.

All paths round Muthikulam should be firetraced to a distance of ten feet on either side, where they pass through grass or deciduous jungle.

687. *Attapadi Blocks II—V.*—The existing practice of firetracing the eastern boundary may continue, but the width of the fireline should be limited to the actual width of the eastern boundary.

688. *Attapadi Block I.*—The southern boundary from the Bhavani to Aruvampara peak may continue to be firetraced, but only to the actual width of the boundary.

689. *The Silent Valley.*—The outer boundaries may continue to be firetraced as at present, but limited to the actual width of the boundary as it exists on the ground.

The question of the fire protection of grasslands inside the valley has been considered. Past fires have been attributed to collectors of minor produce ; it has been prescribed, partly for this reason, that minor produce should be collected departmentally from the Silent valley in future, so that this source of danger will be considerably minimised. The cost of firetracing round these extensive grasslands, with long winding boundaries, is prohibitive, as coolies have to be taken up from the plains. Fire protection of the grasslands will therefore be restricted for the present to the firetracing of all parts to a width of 10 feet on either side, wherever they pass through grass. This, combined with the departmental collection of minor produce, should protect them effectively. Experiments on the feasibility of introducing a belt of fire-resistent vegetation on the fringes of the grassland have been prescribed in paragraph 712 below.

A reference to the statement of fires under paragraph 381 shows that one of the causes of fire has been carelessness on the part of subordinates in burning fire-lines. This is more often the case than is generally recognized, in most forests. Special care must be taken to see that fire does not spread into the forest at the time of fire-tracing.

690. *The Panakadan Reserve.*—This will be fire protected, as at present, over the common north-eastern boundary between the reserve and private forests, but to the actual width of the boundary only.

SECTION 2.—ROADS, PATHS AND BRIDGES.

691. The existing roads and bridle paths shall be maintained in so far as each one is necessary for the purpose it has to serve. The following paths need to be widened in places, by blasting, where necessary, so as to enable a loaded coolie to walk along them without difficulty. A minimum width of 4 feet is prescribed.

(1) *Sappal-Muthikulam* path, where it runs through private forests,
(2) *Sappal-Elival* path between Thodunnanpara and the Elival-Palamalai road,
(3) *Walakad-Poonmalai* path.

692. The following paths have collapsed in several places, and require to be realigned and reconstructed in parts ; the minimum width should be sufficient for a loaded coolie to walk along without difficulty. A tendency to leave rocks jutting out on the path so as to reduce its effective width, is noticeable in some places and should be avoided. A minimum effective width of 4 feet is prescribed.

1. Aruvamparai-Chindaki bridle path.
2. Muthikulam-Vellingiri-Pothuparapallam path.
3. Anamulli-Chindaki path.

693. The following paths are prescribed for alignment and construction: they should be taken up for construction in the order given below :—

1. A foot path from Pulikal to meet the Sappal-Muthikulam path at the Singapara saddle. This is of primary importance, in order to make Attapadi Block VI easily accessible from Malabar, for the staff of the Palghat Range, and for labour, on the transfer of Attapadi Block VI to the Palghat Range, as suggested in paragraph 724. There is a footpath in existence at present, which was freely used by the working-plans staff, but it can be considerably improved in the lower and upper thirds. The work is important and should be taken up expeditiously. An alignment improving the existing path has been made by the working-plans party, which may be followed if found suitable. The probable cost is Rs. 500.

2. It is essential that Nilikal should be made more easily accessible than at present in order to facilitate inspection of the Silent Valley at all seasons. The cart-track from Kumaramputhur to the foot of the Nilikal ghat (about 5 miles) should therefore be converted into a gravelled road 10 feet broad. For this purpose, a certain amount of land will have to be acquired if the owners are not willing to allow of the construction of the road without. This road, including possible land acquisition, is estimated to cost Rs. 6,000. The other large block of shola, Attapadi Block VI, is easily accessible by road from the Coimbatore district *via* Iruttupallam, if and when it is temporarily cut off from the Malabar side, owing to floods.

3. A bridlepath 4 feet wide should be constructed from the Palamalai rest house to the nearest saddle to the north (about 1½ miles), thence westwards through the 'Lost Valley' and across the Palamalai saddle to meet the Sappal-Muthikulam path (about 4 miles). An estimate for this path from the saddle to the north of the Palamalai rest house has already been prepared by the Forest Engineer for Rs. 1,000. His trace has been shown on the Management and Detailed maps. The portion from the Palamalai rest house to the saddle should present little difficulty. It is estimated to cost about Rs. 300.

4. A path from the Muthikulam-Vellingiri-Pothuparapallam path to the limits of the Varadimalai coffee estate, passing close beside the serambi proposed in the Pothuparapallam valley ("Sleepy hollow"). The probable alignment is marked on the map; the estimated length is 4 miles and the total cost about Rs. 1,000. Its construction should present no difficulty. The path is necessary to link up this proposed serambi with another serambi proposed in the sholas of Bolampatty Block II—the "Varadimudi serambi."

5. A path from the Narsapuram-Varadimalai Estate bridle-path to the "Varadimudi serambi," proposed for construction in the sholas of Bolampatty Block II. The estimated length is one mile and its constructions should be easy. The probable cost is Rs. 200.

6. The portion of the ghat road, from the Attapadi tea estate towards Anaikatti and Thadagam, lying in the Malabar district, belongs to the tea estate; the part in the Coimbatore district is proposed to be taken up by the district board for improvement. The Malabar portion will be used for the transport of sleepers from one of the coupes in Attapadi Block VI, once in fifteen years. It may be necessary either to execute the necessary repairs to the road for that year or to agree to bear a share of the cost of annual repairs incurred by the estate.

7. Temporary inspection paths, dragpaths, etc., required for sleeper extraction have been prescribed under the Working Plan for the Selection Working Circle in Chapter II.

SECTION 3.—CAMPS, BUILDINGS AND WELLS.

694. The undermentioned buildings should be taken up for construction, or reconstruction, in the order given :—

1. A serambi and servants' quarters are essential at Singapara, which will be the future entrance to Attapadi Block VI for the Palghat Ranger through Pulikal. Estimated cost Rs. 2,500.

2. A rest house is essential in the sholas of Bolampatty Block II. Theft of *Mesua ferrea* from this area appears to be common and protection has been neglected in the past, as may be inferred from the fact that in spite of the occurrence of extensive illicit fellings of all ages no offences involving *Mesua* timber have been reported for the last several years. Two coupes in the Selection Working Circle have been located here. A rest house in these sholas will certainly help protection in addition to facilitating inspection of extraction and regeneration; the shola is at present difficult of access. Estimated cost of a serambi and out-houses is Rs. 2,500.

3. Two serambis will always be required at Nilikal. The upper serambi as subsiding on account of the decay of the supporting pillars. It should be dismantled and reconstructed on stone and cement pillars. Estimated cost Rs. 500.

4. The rest-shed at Aruvampara has a bad wooden floor and roof, walls of bamboo matting, and a bad veranda floor ; and it is in a condition dangerous to the occupants. A serambi should be constructed behind and above the present servant's lines, and the existing shed made safe for the occupation of the range officer and the forest subordinates ; The present servants' quarters should be replaced by more substantial lines on the same site. Estimated cost Rs. 2,500.

5. Another serambi and servants' lines will be required in the north-eastern corner of Attapadi Block VI in the Pothuparapallam valley. This corner is at present difficult of access as the old forest path leading from Muthikulam to the Attapadi Estate passes along the bed of a perennial stream for over a mile and the bridlepath from Muthikulam *via* Pothuparapallam to Pambar has collapsed in several places. From this serambi one could go through the Varadimalai coffee estate to the serambi in the sholas of Bolampatty Block II, prescribed above. A probable site is located on the map. Estimated cost Rs. 2,500.

SECTION 4.—EXPLOITATION AND UTILIZATION.

695. *Kolmarams.*—From the major part of the Selection Working Circle, exploitation has to be limited mainly to the extraction of broad gauge *Mesua* sleepers, for the present, owing to economic causes.

When exploitation was commenced in the Silent valley in 1928, there was considerable demand for kolmarams and chattams of *Palaquium* and *Calophyllum* but owing to the general trade depression, both the demand and the price have fallen. With increasing leads it has become difficult to deliver the goods at profitable rates, except from nearer localities like Kalladikode. As soon as the market improves, such of the coupes as can be profitably worked for this material, should be so worked.

From the coupes in Bolampatti Block II, and such of the coupes in Attapadi Block VI as may be extracted towards Iruttupallam (Coimbatore), kolmarams and chattams of *Palaquium* and *Calophyllum* can be profitably extracted if the demand improves. This possibility should be borne in mind.

The extraction of kolmarams from the sholas of Chenat Nair to the west of Palamalai, which the exploitation division worked for *Mesua* and *Hopea* sleepers only, is not prescribed during this felling cycle, as a large number of *Mesua* trees, down to a minimum girth below which metre gauge sleepers could not be made profitably, has already been felled in it ; in fact, more than 3 trees per acre have been felled in these operations, and further exploitation is undesirable.

696. *Plough shafts.*—There is a considerable demand for plough shafts of *Mesua ferrea* in the Coimbatore district, both in the villages adjoining the forest and also in the Avanashi taluk ; the extensive illicit fellings of this species in the Bolampatti shola have almost certainly been made largely to supply this want. The possibility of meeting the demand legitimately from the Bolampatti coupes and from the coupes of Attapadi Block VI to be extracted towards Iruttupallam, must be realized and steps taken to effect a sale of top-ends and rejections after conversion of the felled trees, in order to satisfy the demand.

697. *Sleepers.*—The extraction of sleepers from the coupe situated in the north-east corner of Attapadi Block VI will perhaps cost more in transport charges than any other coupe of the working circle. The following estimate is based on enquiries at Thadagam :—

		RS.	A.	P.
1	Felling and conversion of one broad gauge sleeper	1	8	0
2	Dragging to head of estate road	2	4	0
3	Carting to Coimbatore (four sleepers per cart at Rs. 8 a cart).	2	0	0
4	Overheads (including District Forest Officer, excluding Conservator, Chief Conservator, etc.)	1	0	0
	Total ..	6	12	0

There will be a small balance on the profit side, still. But the exploitation of over-mature timber is justifiable from a silvicultural point of view, even if no profit can be made, since the future value of the forest will be improved considerably as a result of regeneration and tending. All other coupes are likely to show better economic advantage.

The possibility of selling railway sleepers of *Palaquium* and *Calophyllum* to the Nizam's State Railways (and other such railways in dry tracts) should be investigated. In 1928, there was a demand for 80,000 metre gauge sleepers of miscellaneous species, including

Palaquium and *Calophyllum*, from the Nizam's state, and the Forest Utilization Officer was informed by the Conservator, V Circle, that no supply could be made from his Circle. If sleepers of the above mentioned species could be sold from the sholas in sufficiently large numbers, at even a small margin of profit we would make a handsome revenue.

698. *Seasoning of sleepers.*—The advantages of supplying sleepers of *Mesua ferrea* seasoned in the shade of the sholas after proper stacking, should be studied. Experiments should be made in consultation with the Forest Utilization Officer, a small proportion of the sleepers sawn at the beginning of the year being stacked scientifically and delivered only towards the close of the year after some 9 or 10 months seasoning. The experiment must be so conducted as to make it possible to compare the degrade, and consequent percentage of rejection of the seasoned sleepers, with that of those delivered in the ordinary course.

699. *Seasoning of kolmarams.*—Similar experiments should be undertaken to study the effect of seasoning, in the sholas, of kolmarams of the undermentioned species :—

Palaquium ellipticum, *Calophyllum elatum*, *Vateria macrocarpa* and *Poeciloneuron indicum*.

700. *Match making.*—The wood of *Vateria macrocarpa* has been found to be eminently suitable for match-splints and match boxes ; timber for experiment was supplied to a local factory and it was found that the splints had a clean white colour and did not break easily when struck. Transportation costs prohibit any idea of extracting this species and delivering it at the match factories. But small portable machines capable of turning out splints or boxes *in the forest* appear to offer a solution. The possibilities of using such machinery might with advantage be investigated. The best-stocked *Vateria* area can be made accessible through the Attapadi tea-estate, at a small cost. Splints and boxes can be transported to the plains on donkeys, just as coffee is being transported now, or in carts.

701. *Floating.*—The possibility of floating sleepers, kolmarams, and chattams down the Kanhirapuzha from Attapadi Block VI to Cherukara, on the Shoranur-Nilambur Railway, and to Ponnani on the coast, should be investigated. A new market might thus be created at Ponnani for supplying Bombay and Kathiawar.

702. *Rosewood.*—Economic extraction of rosewood (*Dalbergia latifolia*) from some parts of the Attapadi valley is a difficult problem.

The possibility of extracting it by means of elephants, in logs suitable for export, should be studied.

If this be not economically feasible, its conversion to sizes suitable for extraction and profitable sale should be investigated ; the sale in the form of *railway sleepers* may well prove a valuable source of revenue.

703. *Minor produce.*—It has been prescribed that the minor produce in the Silent Valley Reserve should be collected departmentally in order to minimise fires. The departmental collection of cardamoms should be taken advantage of to ascertain the quantity that is likely to be available from an area of known extent, in full bearing, and the most profitable means of marketing it. The revenue from this source is likely to be far from negligible in the future, on account of the spread of cardamoms into the gaps created by selection fellings.

The seeds of *Palaquium ellipticum* contain an appreciable percentage of an oil which, on analysis, has been found to be similar to *mohwa oil* (*Bassia latifolia*) and is reported to be suitable for soap-making. Further experiments should be undertaken, with the help of the Kerala Soap Institute, Calicut, or of some other oil and soap experts, with a view to ascertaining definitely the usefulness of the oil for soap-making, and efforts should be made to market the seeds, if they are found to be suitable.

SECTION 5.—BOUNDARIES.

704. Discrepancies have been noticed in the western boundary of the Silent Valley Reserve, the northern boundary of the Attapadi Block VI, and the southern boundary of the Attapadi Block I ; this has been mentioned in paragraphs 27, 28 and 30. It has also been mentioned that the boundaries of the Silent Valley Reserve and Attapadi Block VI are overgrown in places and are therefore difficult of identification.

The differences noticed were between the boundary as shown in the Survey of India maps, and that described under section 16 notification or that cut on the ground. The description of the boundary according to section 16 notification is vague in places.

705. It is necessary, in the interests of Government, that boundaries of reserved forests should be described in unmistakable terms and that the description should agree with the demarcation on the ground. It is therefore prescribed that an officer of the gazetted rank should be deputed to verify (1) the western and southern boundaries of the Silent Valley up to the Kundipuzha, (2) the

southern boundary of Attapadi Block I from Aruvamparai to the Bhavani and (3) the northern boundary of Attapadi Block VI. On verification, the boundaries should be rectified, or revised boundary descriptions issued, as the case may be, in consultation with the Collector. It is suggested that the northern boundary of Attapadi Block VI be accepted as at present surveyed and demarcated, and a revised section 16 notification issued.

706. *Maintenance.*—All external boundaries should be properly maintained. Such as are being fire traced annually do not require any further attention. But boundaries not so fire traced should be cleared of all under-growth and grass, and burnt once in *three years*, under proper sanction.

SECTION 6.—AREAS OF RESERVES.

707. In all cases, except one, differences have been noticed between the areas of reserves as given in the notifications under section 16 of the Madras Forest Act and those recorded in the Survey of India maps—vide statement under paragraph 23. All the reserves have been surveyed by the Survey of India *after* reservation, so that the areas furnished by them are likely to be more accurate than those given in the notifications under section 16 in the case of reserves of large extent. But since the areas of small reserves given in such notifications were presumably obtained from the revenue survey of the locality, these areas have been accepted in their case in preference to the Survey of India figures, as the revenue maps are usually prepared to a larger scale than the Survey of India maps, which have been prepared to a scale of 1 inch = 1 mile only.

The District Forest Officer will take necessary steps to reconcile these differences.

708. The areas adopted in this plan are those given by the Survey of India in the case of reserves of large extent, but for small reserves section 16 notifications have been followed.

SECTION 7.—RESEARCH AND COLLECTION OF STATISTICS.

709. *Girth increments.*—In order to obtain statistics of girth increment at various girths for *Mesua ferrea* and *Palaquium ellipticum*, so as to help in fixing the rotation at which these species should be worked, tree increment plots have been laid out. Sample trees have been selected and measured in the sholas of the Silent Valley and Attapadi Block I. One hundred and sixty *Mesua ferrea* and 158 *Palaquium ellipticum*, distributed as equally as possible in 6 inch girth classes, from 6 inches at breast height up to 8 feet, have been selected, along prominent bridlepaths and footpaths. The trees of both species have been numbered serially with white paint and also galvanized tin plates bearing the same numbers have been nailed on them exactly 18 inches above a painted white cross which indicates the breast height level at which girth measurement was taken and recorded by the writer. The trees have been selected within about a chain on either side of the paths. A field book showing the species, number, location, silvicultural condition and girth of the selected trees has been written up. All girths have been measured with a steel tape, under the writer's direct supervision. A copy of the field book will be given to the Provincial Silviculturist and he will measure these sample trees once in every three years. Another copy of the field book will be supplied to the District Forest Officer, who will be responsible for taking due care of the trees and for renewing the numbers and crosses when necessary. Vide Appendix IV for field book.

710. *Natural regeneration of Palaquium.*—Experiments should be undertaken in consultation with the Provincial Silviculturist with a view to ascertain the conditions necessary for the establishment and development of the natural regeneration of *Palaquium* so abundant in the sholas. Sample plots may be laid out in the Silent Valley or in the neighbourhood of Palamalai rest-house, in the Chenat Nair reserve.

711. *Natural regeneration of Mesua.*—The natural regeneration of *Mesua ferrea* in the *Cullenia-Palaquium* association of the tropical rainforest (the most widely spread association) between 2,000 feet and 3,500 feet, is far from satisfactory, as mentioned in paragraph 119. In order to ascertain how such natural regeneration may be induced best, and how it may thereafter be established and developed, experiments should be undertaken in consultation with the Provincial Silviculturist, if possible *within such associations.* Experiments conducted under different conditions and in a different sub-type of shola, as in the Wynad may, it is suggested, fail to yield results applicable to the locality in question.

712. *Fire protection of grassland in sholas.*—The grasslands in the Silent Valley enclosed by shola, are subject to almost annual fires ascribed to collectors of minor produce. These fires destroy the fringe of the sholas, which otherwise probably naturally extend into the grassland. A belt of fire-resistant vegetation between the shola and the grass would check this destruction, and in fact, where nature has succeeded in establishing species like *Wendlandia notoniana* and *Acronychia laurifolia* along the edges of the sholas the desired result has been attained.

The following experiment will therefore be conducted with a view to examine what species can most easily and successfully be raised as a firebelt :—

The grassland to the left of the path leading eastwards from the Poochipara saddle to the Kundipuzha (and thence to Poonmalai) will be selected for the experiment.

A strip of grassland 10 chains long and 1 chain broad, adjoining the shola, will be chosen. All grass to a width of 20 feet from the shola will be uprooted ; and over the rest of the strip it will be cut to ground level ; guide lines 6 feet wide on either side of the cut line will be cleared of all cut and uprooted grass, which will be thrown in the middle. The line will be then thoroughly burnt by the end of March, when the grass is dry. The result will be a cleared strip of grass 1 chain broad and 10 chains long, with the grass cut and burnt over the greater part of it, and uprooted to a width of 20 feet from the edge of the shola.

Seeds of the following species will be sown each over a length of 2 chains in this cleared and burnt strip, over its full width of a chain. The species to be tried are :—*Wendlandia notoniana*, *Acronychia laurifolia*, *Gordonia obtusa*, *Symplocos spicata* and *Acacia dealbata*. Other species, if considered suitable, may also be tried at the discretion of the District Forest Officer.

Seeds of *Wendlandia notoniana* may be obtained near Poochipara rest-house in the Silent Valley and near Palamalai rest-house in Chenat Nair. The seeds are tiny, and one might collect all chaff and no seed unless the collection is examined with a lens. *Acronychia* fruits may be collected from trees in the vicinity of Muthikulam waterfall, on the grass margins of the sholas. Seeds of *Gordonia* and *Symplocos* may be obtained round Palamalai rest-house or along the Walakad-Karuvarakudu bridlepath, and *Acacia dealbata* from the District Forest Officer, Nilgiris.

In February March of the next year grass should be cut over the whole strip and the result of the past sowings noted and recorded, for the uprooted area and the cut area, separately. Any grass found on the uprooted area should then be cut and thrown on the cut area, and the strip, with the exception of the uprooted area, should be burnt again by the end of March, as previously. The sowings will then be repeated exactly as in the previous year.

These operations will be repeated again in the third year.

The results should be reported to the Conservator of Forests every year, and the Provincial Silviculturist should be consulted periodically.

713. *Statistics for the preparation of volume tables.*—Statements showing the girth at breast height, and the gross and net volumes of all trees felled and converted in the coupes of the year, should be prepared for every tree felled from each of the different associations marked on the map. These should be forwarded to the Provincial Silviculturist every year to enable him to prepare volume tables separately for the quality classes found in the different associations, and to supplement the tables already prepared. It follows that the original entries in form 3 should hereafter be separately made for the different associations that sometimes occur within a coupe.

714. *Dalbergia sissu on the islands of the Bhavani.*—Several islands of considerable extent (of a total area of about 40 acres) occur in the Bhavani river within the area allotted to the Chindaki series of the Teak Conversion Working Circle. These areas will not come up for regeneration for another ten or twenty years, so that the tree species that should be grown on them have not been discussed under that working circle. It is doubtful if teak could be successfully grown on the sandy alluvium of these islands, but they appear to be ideally suited for a crop of *Dalbergia sissu* mixed with *Dalbergia latifolia* ; and they support a fair quality of mixed deciduous species at present. It is prescribed that one acre of this type of forest should be felled in 1934 and regenerated with teak, *Dalbergia latifolia* and *Dalbergia sissu* with a view to decide which of these species are most suited to the locality.

Regeneration notes on the species concerned will be found in the Madras Forest Pocket Book.

A report on the results of the experiments should be submitted to the Conservator of Forests.

715. *Tending of natural regeneration in heavily logged sholas.*—It has already been prescribed in Chapter V that the Provincial Silviculturist should be consulted as to the possibility of undertaking experiments to determine the best way of tending the natural regeneration in heavily logged sholas of the Chenat Nair reserve.

716. *General.*—Experiments on the regeneration of shola species and on the extension of underwood in teak plantations, have been prescribed under the working plan for the working circles concerned.

SECTION 8.—STORES, TOOLS AND PLANT.

717. An amount of Rs. 4,000 has been provided for expenditure under this head for the remaining period of the plan.

SECTION 9.—TIMBER TRANSIT RULES.

718. For the prevention of smuggling of timber from the reserves from which sleepers and kolmarams are extracted, it is necessary to establish checking stations, temporarily, on the route along which Government timber is being transported for the time being. This can usually be effected by the temporary transfer of one of the eight checking stations in the division to the required site. If this cannot be done without incurring risks of smuggling from elsewhere, the sanction of the Collector should be sought for the establishment of such temporary tannahs as are absolutely necessary.

SECTION 10.—REALLOCATION OF RANGES.

719. The Attapadi Felling series of the Selection Working Circle consists of the Chenat Nair and Attapadi Block VI reserves and the shola portion of Bolampatti Block II. Out of a total of 13 coupes in this series, only two coupes and a portion of a third fall in the Chenat Nair reserve, belonging to the Palghat range ; eight coupes and a portion of the ninth fall in Attapadi Block VI, and two coupes in Bolampatti Block II, both belonging to the Bolampatti range.

720. The Palghat range consists at present, of the Chenat Nair and the adjacent small reserves, and the Walayar forests.

The Walayar forests could be conveniently divided into two parts, one cis-Walayar, wholly in the Malabar district, and the other trans-Walayar in the Coimbatore district, and adjoining Bolampatti range, the common boundary being the Walayar [river]. Work in the portion of the forest in the Coimbatore district is at present confined to one series of fuel coupes, one series, and one coupe of a second series, of bamboo coupes, and part of a Pole Working Circle, not likely to be worked before 1941.

In the cis-Walayar part, belonging to the Malabar district, the work consists of one coupe of the Pole Working Circle for felling and regeneration and two coupes of a bamboo series.

The Palghat Range Officer now has, in addition, to regenerate about 40 acres in two places in the Chenat Nair reserve, with teak, and to attend to the extraction of sleepers and kolmarams from and regeneration of, the coupes of the Selection Working Circle in the Kalladikode valley, which commenced in 1930, and to one series of bamboo coupes.

721. The Bolampatti Range Officer has now only one Ponam coupe for regeneration, every year, about 30 acres in extent, and to look after six series of fuel coupes and one series of bamboo coupes. An Extra Assistant Conservator is now looking after the Ponam coupes.

722. It will be apparent from the foregoing that the Range Officer, Palghat, has considerably more work to do than the Range Officer, Bolampatti.

723. As has been mentioned in Chapter IV, labour for the conversion and dragging of sleepers (and kolmarams) from Attapadi Block VI and Bolampatti Block II, has to be obtained from localities in Malabar at the foot of the hills constituting Attapadi Block VI. A large part of the produce has also to be extracted through Malabar to the Olavakot market, though a few coupes will have to be extracted through the district of Coimbatore, to the Coimbatore market. The Range Officer of Bolampatti range can have no control over labour recruited in Malabar, so that he cannot efficiently perform all the operations necessary to make the extraction of sleepers successfull ; nor would he be able to carry out the regeneration and tending of the worked coupes satisfactorily, for the same reason.

724. It is therefore suggested that Attapadi Block VI be removed from Bolampatti range and transferred to Palghat range so as to form part of the new Palghat range. Attapadi Block VI is in the revenue district of Malabar, so that the transfer will be advantageous on this score. The reserve is accessible from the Malabar side through a footpath from Pulikal, about 20 miles by road from Olavakot. The footpath was freely used by the working plans party and is about five miles long.

It is also suggested that the trans-Walayar part of the Walayar forests lying in the Coimbatore district be removed from the Palghat range and transferred to the Bolampatti range, which will then be entirely in the Coimbatore district, as the new Palghat range will be solely in the Malabar district.

725. By this transfer the work of the Palghat Range Officer will be lightened considerably, and this is necessary for the proper discharge of his duties. The work of the Range Officer, Bolampatti, will be increased in proportion but he is not overworked at present. The Walayar forests are moreover not very difficult of access from Iruttupallam (the headquarters of Bolampatti range) on account of the railway and an hourly motor bus service that passes through them and which starts from Alandurai about three miles from Iruttupallam.

726. The forest guards in charge of the trans-Walayar blocks will be transferred to the new Bolampatti range; those in charge of Attapadi Block VI, to the new Palghat range; no other transfers of subordinates need be effected. The forester, Navakarai, can take charge of the operations in Attapadi Block VI.

SECTION 11.—MALARIAL PROPHYLAXIS.

727. Past experience has shown that sholas are not as virulently malarial as the neighbouring deciduous forests at similar or lower elevations. Malaria was practically unknown in the sholas of the Silent Valley until sometime after the commencement of sleeper operations, when coolies infected with the malarial parasite from other sources communicated the parasite to the local mosquito.

728. In order to minimize the spread of malaria, camp sites should be kept clear of all undergrowth to a distance of 50 yards all round, and all perennial streams and pools of stagnant water, except the drinking supply, should be treated with crude kerosene oil, by placing bags of saw dust soaked with the oil in the streams and by pouring small quantities of oil, at frequent intervals, into the stagnant pools. The subordinates and the coolies should be encouraged to smear all exposed parts of their bodies with an emulsion of soap, coconut oil and kerosene oil (1 part kerosene + 1 part coconut oil + 2 parts of hot water with about ½ lb. of soft soap dissolved in it) every evening at sundown. If the emulsion is not available plain kerosene oil may be used.

SECTION 12.—CONTROL.

729. *General.*—The importance of careful and efficient control of the execution of the prescriptions of the working plan can scarcely be over-emphasized; the District Forest Officer is therefore personally responsible for the correct posting of the Control records referred to under the working plans for the different working circles. The following records have been prescribed:—Control Book, Record of Works, Annual Summary of Revenue and Expenditure, Nursery Ledger, Regeneration Ledger, Gap Register, Compartment History, Control Journal and Extraction, Regeneration and Control maps.

All the foregoing control records shall be maintained in the District Forest office. By the 15th of May of each year, copies of entries relating to the previous year shall be made from the Control Book, Record of Works, Control Journal, Annual Summary of Revenue and Expenditure and Compartment History, and submitted to the Conservator of the Circle. Sample forms and entries will be found in Appendix II except for the Control Journal.

730. *Control Book.*—A single register will be maintained for the whole area covered by the working plan. Pages will be allotted separately for each felling series, or each working circle, as the case may be. The results of primary extraction work alone should be recorded here.

731. *Record of Works.*—A single Record of Works shall be maintained which will control all works other than primary exploitation. Pages will be allotted separately for each felling series or each working circle, as the case may be. The last few pages will control the execution of works which cannot be allotted to a particular working circle—fire-protection of the outer boundary, for example, will be common to all the working circles inside the boundary, but fire-tracing round plantations will be recorded under the respective working circle and felling series.

732. *Annual Summary of Revenue and Expenditure.*—The summary of revenue and expenditure will serve to compare the results of working, with the financial forecast made in Chapter XI below.

733. *Nursery Ledger.*—This is necessary to control nursery expenditure, which has been heavy in the past. A sample form will be found in Appendix II (*g*). It will be maintained separately for each nursery, in the District Forest Office and by the Range Officer. This record should be kept strictly up to date by the Range Officer, entries being made for the previous month before the tenth of the next month.

734. *Regeneration Ledger.*—This controls expenditure on regeneration of plantations or gaps. It will be maintained both by the Range Officer and by the District Forest

Officer, in the form prescribed in Appendix II (*h*). This record should also be kept strictly up to date.

735. *Gap register.*—This is part of the Regeneration ledger for the "Selection Working Circle." A sample form will be found in Appendix II (*e*).

736. *Compartment history.*—A compartment history will be maintained for the Selection, Tending and Teak Conversion Working Circles. The description of each compartment has been written up by the writer, with its history up to date, as far as can be gathered. All changes that take place within a compartment, as a result of natural silvicultural changes or as a result of work done, should be recorded in the history so that it may be possible to note whether the forest is improving or degenerating under the methods of treatment applied.

All exploitation work will be recorded, with the yield, as well as all tending or thinnings, and gap regeneration. *Definite* natural occurrences which influence the state of the crop, such as severe fires, flowering of bamboos, and profuse *Mesua* regeneration after a seed year and similar happenings should also be recorded. All recorded information must, however, be definite.

Similar forms shall be prepared by the District Forest Officer for new compartments formed each year in the Teak Conversion Working Circle.

The District Forest Officer is responsible for the prompt and correct posting of the annual entries.

737. *Control Journal.*—A Control Journal should be maintained as prescribed in the Forest Code. One volume should do for the whole of the working plan area, being divided into parts for each felling series or working circle, as the case may be. In addition to the headings prescribed in Appendix 8 of the Forest Code, information shall be recorded on (1) annual artificial regeneration operations and experiments, (2) gross and net yield from felled trees, (3) cost of production of each kind of produce, giving details for each operation and the total, and (4) Annual Summary of Revenue and Expenditure as given in Appendices II (*c*) and (*d*). The purpose of the Control Journal is to record all useful and interesting observations made in the field. Suggestions for improving existing practice should be made freely.

738. *Control Maps.*—Extraction and Regeneration maps have been described in the working plan for the Selection Working Circle, and control maps in the working plan for the Teak Conversion Working Circle. They should all be maintained as described therein.

SECTION 13.—PRESERVATION OF SPECIAL TREES AND FOREST TYPES.

739. The undermentioned trees and areas in the Chenat Nair and the Silent Valley Reserves, are prescribed for permanent preservation, as specimen trees and types of the tropical rain-forest of the locality. This is in accordance with the recommendation of the Third Silvicultural Conference held at Dehra Dun, in 1929.

(*a*) *Chenat Nair Reserve.*

740. *Special trees.*—Two *Dalbergia latifolia* (*sissoides*?) trees growing near the Research Nursery at Dhoni and numbered D-1 and D-2, will be preserved for their natural life time. Their present girths at 4 feet 6 inches from ground level are D-1 = 8 feet 9½ inches, D-2 = 6 feet 8 inches. The point over which the girth was measured has been marked with a cross in white paint. They will be under the care of the Provincial Silviculturist.

741. *Rainforest type.*—The area of typical rainforest selected surrounds the Palamalai rest-house and covers 218 acres. The elevation varies from 2,000 feet to 3,000 feet above mean sea level. The estimated rainfall is 150 inches per annum. It may be known as the "Palamalai shola."

742. *Boundaries.*—North : The grassy slopes of Palamalai and Elival-malai. East : A stream and the grassy slopes of Elival-malai. South : A series of cliffs between the 2,000 feet and 2,250 feet contours, forming a distinct boundary between the shola above them and the deciduous forest below. West : A stream flowing nearly due south from the Palamalai grass slopes, about a furlong to the west of the Kalapara-Indakunnu foot path.

743. *Description.*—The growth consists of *Mesua ferrea*, *Palaquium ellipticum*, *Calophyllum elatum*, and some young *Hopea parviflora*, mixed with the usual less valuable species like *Cullenia excelsa*, *Gordonia obtusa*, *Elæocarpus sp.* and *Nephelium longana*. *Calophyllum elatum* is particularly well represented and the natural regeneration of *Palaquium ellipticum* is strikingly prolific in all its stages. It belongs to the "*Cullenia-Palaquium*" association as defined in this working plan.

The natural afforestation of grassland adjoining a shola, by species like *Wendlandia notoniana, Gordonia obtusa, Symplocos spicata* and *Elæocarpus munroii*, is well exhibited round the Palamalai rest-house.

744. *Demarcation.*—The natural boundaries described above demarcate the area sufficiently.

745. *Control.*—The area will be in charge of the Provincial Silviculturist as an experimental plot though the District Forest Officer, will of course, be responsible for its general protection. No clearings, fellings or extraction of any kind may be permitted within the area except under the orders of the Provincial Silviculturist, who may conduct any such operations within well-demarcated sample-plots, in pursuit of silvicultural experiments, with the previous approval of the Conservator of Forests.

Dead fuel may, however, be removed for the use of officers camping at Palamalai rest-house.

746. *Fire protection.*—There is no danger from fire from the east, south or west.

The grassland to the north should be protected by fire-tracing the path leading from Palamalai rest-house to the saddle between Palamalai and Elival-malai, to a width of ten feet on either side of the path.

This will be done by the District Forest Officer and the cost included in the fire-protection operations of the district.

747. *Publicity.*—The District Forest Officer, Palghat, will furnish the forest-rest-houses at Olavakot, Dhoni, Sappal and Palamalai, with notifications regarding the whereabouts of the Palamalai shola and the two rosewood trees.

The Palamalai shola has been coloured distinctively in the working plan maps and the position of the two rosewood trees indicated by red crosses.

(*b*) *The Silent Valley Reserve.*

748. *Rainforest type.*—It is considered necessary to preserve a specimen of the rain-forest type in the Silent Valley as it is different from the type met with in the Chenat Nair Reserve, owing to a much heavier rainfall—about 250 inches in the year. The area selected surrounds the Nilikal rest-house, the most accessible camp in the Silent valley. Though it was partially exploited by the removal of a limited number of the mature *Mesua ferrea, Palaquium ellipticum* and *Calophyllum elatum* in 1928–29, it contains all lower girth classes of the species we require to exhibit, as well as a few of the higher, and will as the younger trees mature give a good idea, to future generations, of what the original shola was like.

The elevation is 3,200 feet to 3,500 feet. The area is 208 acres. It may be known as the " Nilikal shola."

749. *Boundaries.*—North and East : A part of the reserve boundary and the bridlepath from Nilikal to Poochipara. South : The reserve boundary up to Vannamparai peak. West : The reserve boundary.

750. *Description.*—The growth consists of *Mesua ferrea, Palaquium ellipticum, Hopea glabra, Cullenia excelsa, Gordonia obtusa, Elæocarpus tuberculatus,* and *Artocarpus intergrifolia,* in the first story, *Nephelium longana, Elaeocarpus serratus, Litsea stocksii, Canarium strictum, Glochidion malabaricum, Pygeum wightianum, Symplocos spicata, Adenochloena indica, Lansium anamalayanum, Leea sambucina, Agrostistachys indica, Agrostistachys longifolia, Euonymus angulatus, Eugenia laeta, Eugenia munroii, Macaranga roxburghii, Paramignya armata, Calamus sp.* reeds, *Pinanga discksonii, Canthium didymum* and other species. A more detailed description will be found in Chapter II of Part I. The area belongs to the " *Cullenia Palaquium* " association as defined in this working plan.

Natural regeneration of *Mesua ferrea* and *Palaquium ellipticum* is well represented. Gaps caused by selection fellings have been regenerated with *Acrocarpus fraxinifolius* and *Artocarpus hirsuta.*

751. *Demarcation.*—No special demarcation is necessary as the reserve boundary and a bridlepath surround the area.

752. *Control.*—The area will be in charge of the Provincial Silviculturist, as an experimental plot, though the District Forest Officer will of course be responsible for its general protection.

No clearings, fellings or extraction of any kind may be permitted within the area except under the orders of the Provincial Silviculturist who may conduct any such operations within well-demarcated sample plots, in pursuit of silvicultural experiments, with the previous approval of the Conservator of Forests.

Dead fuel may, however, be removed for the use of officers camping at Nilikal rest-house.

753. *Fire protection.*—The reserve line which forms the major part of the boundary, is being fire-traced every year. In spite of this a fire crossed over from the surrounding deciduous forests (privately owned) in 1929. Special care should be taken to keep the boundary clear of all combustible material during the fire season. The District Forest Officer will continue to be in charge of the fire protection of the area.

754. *Publicity.*—The District Forest Officer, Palghat, will furnish the serambis at Nilikal, the Range office, Mannarghat, the Local Fund rest-house at Mannarghat, and the Forest rest-house at Olavakot with notifications regarding the Nilikal shola. The area has been coloured distinctively in the working plan maps.

CHAPTER X.—ESTABLISHMENT AND LABOUR.

SECTION 1.—ESTABLISHMENT.

755. *Executive staff.*—The existing staff is sufficient for carrying out current works. The extra work that will accrue as a consequence of the prescriptions of the plan will be ten acres of regeneration and tending in the Panakadan reserve and a similar extent in the Attapadi Block I. The works are comparatively light since the regeneration proposed will be largely undertaken by the kumridars, in both these places, so that the beat guards, under the supervision of a forester, should be able to execute them efficiently. An extra forester is at present available for this purpose as the number of foresters allotted to this division has been increased from 13 to 14, recently. No further increase in executive staff is required.

756. *Clerical.*—Three depot-keepers are at present in charge of the depots at Olavakot, Mannarghat and Melattur ; their pay is being charged to the sleeper operations. This procedure may continue. The question of making the posts permanent will be examined when the working plan is revised.

The Palghat and Mannarghat Range Offices each have one temporary clerk in addition to their one permanent clerk ; the pay of these temporary men is also being charged to sleeper operations. Since sleeper extraction is now a permanent regular work these posts should be made permanent.

Two temporary clerks have been sanctioned for the District Forest office, one in 1929, and the other in 1931. The question of obtaining permanent sanction for these posts should also be taken up by the District Forest Officer, as the work of the office, so far from decreasing in the future will become heavier owing to extra work prescribed in this working plan.

SECTION 2.—LABOUR—HILL TRIBES.

757. *Kumri.*—It has been mentioned in Chapter I, Part I, that the settlements of hill tribes in Attapadi Blocks I to VI have been allotted insufficient extents of lands for kumri cultivation in the past. There is a possibility of some of these settlements quitting the reserved forests unless sufficient land is allotted to them for the purpose. It is of importance that the hillmen should continue to live within the reserves, in order to provide labour for departmental works especially now that teak plantations have been proposed to be raised in Attapadi Blocks I to V, along with 'kumri.' The ten acres of annual 'kumri' prescribed for teak planting will not afford the required relief, however.

Under existing conditions, an area once kumried has to come under kumri again on a 4 year rotation ; this period is not long enough to produce sufficient material to allow of the good burn which is essential for 'kumri' cultivation. The areas required by each settlement on the basis of the existing population and a 10-year rotation have been calculated as follows :—

	ACS.		ACS.
1 Thadikundu	156	5 Kurukattikallu	96
2 Anavoy	84	6 Todiki	216
3 Murigalai	108	7 Kadukumanna	84
4 Gottiakhandi	60	8 Sundanari	180
9 Muthikulam	To be decided after shifting of site.		

The area allotted to each settlement will be divided into six equal compartments. One of these will be leased out for kumri for two successive years, in rotation, and so on *ad.lib.* Proper sanction should be obtained before the areas are demarcated and the leases entered into.

The settlement at Sundanari has lands so situated at present that it is habitually frequented by wild elephants which prevent them effectively from harvesting any crop.

They will be permitted to give up this land to the department, in lieu of which an area of 180 acres will be demarcated in a suitable locality. Pottikal, an abandoned settlement, is a likely place.

The settlement at Muthikulam will have to shift in the near future to a different site when the Siruvani dam floods the surroundings (Coimbatore Water Works). The area to be allotted to them may be decided by the District Forest Officer when they shift.

758. *Grazing.*—Several of the settlements keep cattle—cows and buffaloes—which they graze inside the reserves on sufferance. This practice should be legalized by the grant of a reasonable number of free permits, based on a cattle census. There is no need to discourage the keeping of a few head of buffaloes, cows or sheep, but it should be under proper control.

CHAPTER XI.—FINANCIAL FORECAST AND COST OF THE PLAN.

SECTION 1.—FINANCIAL FORECAST.

759. Statements showing details of the estimated revenue and expenditure during the 10-year period of the working plan are given below; an abstract of the forecast is also furnished.

760. The main source of revenue from the area covered by the working plan is from the sleepers of *Mesua ferrea* supplied to the South Indian Railway. The sale value of a broad gauge sleeper has fallen from Rs. 8–8–0 in 1928–29 to Rs. 7–12–0 in the current year. When the prevailing general trade depression passes away, better prices may be expected.

761. Kolmarams are the next important source, but the general fall in prices and the increase in lead have made it difficult, or impossible, to market this commodity in considerable quantity. With improvement in trade, we should be able to put many more of these into the market at profitable rates. Attempts should then be made to increase the production and sale of this material. If a market can be found for the sleepers of *Palaquium* and *Calophyllum* (vide paragraph 697) even at a small margin of profit, it will help to reduce 'overheads,' which are high at present—the establishment and Conservator's overheads cost about Rs. 4,26,000.

762. The cost of production of sleepers and kolmarams increases with lead. The nearer areas were worked first, naturally, at a comparatively smaller cost of production, and the sale prices were also better then. The future coupes are therefore likely to show a reduced profit, unless sale prices improve.

763. The natural spread of cardamoms into the gaps created by selection fellings is full of future possibilities. We know little now about the profits made by the lessees of this produce, nor of the quantities produced by our reserves. The increase of revenue from this source cannot be estimated with any accuracy at present.

764. Expenditure has to be incurred in tending the areas in the Chenat Nair Reserve, 'logged' under American methods. Our only legacies from this costly and disastrous experiment are a ruined forest and several roads and buildings, which need never have been constructed otherwise. The former has to be tended and the latter have to be maintained: both need money.

ABSTRACT OF FINANCIAL FORECAST.

Revenue.

		RS.
1	By sale of sleepers, kolmarams, chattams and timber from Selection Working Circle	14,77,351
2	By sale of coupes in the four felling series of the Teak Conversion Working Circle	34,260
3	By sale of thinnings in teak plantations	6,110
4	By sale of fuel coupes	3,500
5	By sale of bamboo coupes	20,000
6	By lease of minor produce	19,500
7	By sale of minor forest produce collected departmentally	10,000
8	Rent of buildings	15,200
9	By sale of permits	1,000
10	By sale of condemned stores	250
11	By compounding fees	3,000
12	Fines and forfeitures	500
13	Shooting licences	400
14	Contribution from District Board for road	7,750
15	Refunds and drawbacks	499
	Total gross revenue	15,99,320

Expenditure.

		RS.
1	Cost of production of sleepers, kolmarams, chattams and other timber	9,79,610
2	Regeneration and tending of coupes in the Selection Working Circle	8,250
3	Survey and demarcation of coupes in Teak Conversion Working Circle	410
4	Formation and tending of plantations, four series, Teak Conversion Working Circle	17,040
5	Thinnings in teak plantations	5,855
6	Regeneration of paddy flats, Fuel Working Circle	30
7	Tending in the Chenat Nair 'logged' areas (Tending Working Circle)	2,818
8	Collection of minor produce, Silent Valley	3,000
9	Regeneration of cardamoms	400
10	Fire protection	11,690
11	Repairs to roads and paths	20,000
12	New roads and paths and improvements to old ones (5 per cent for five years)	2,412
13	Repairs to buildings	10,000
14	New buildings and improvements to old ones (5 per cent for five years)	2,625
15	Maintenance of boundaries	930
16	Experiments	3,000
17	Stores, tool and plant	4,000
18	Malarial prophylaxis	1,000
19	Establishment, pay and allowances, etc.	4,25,890
	Total expenditure	14,98,960
	Surplus	1,00,360
	Net surplus per annum	10,036
	or	10,000 approximately.

765. The revenue and expenditure for the last three years after commencement of sleeper operations, for the area covered by the working plan are given below :—

Revenue.

	1929–30.	1930–31.	1931–32.
	RS.	RS.	RS.
By sale of sleepers and kolmarams	1,08,570	1,57,962	1 27 460
,, other timber	..	1,523	3,261
,, fuel coupes	2,485	2,258	3,631
,, bamboo coupes	424	2,263	2,100
,, minor produce	3,245	2,280	847
Compounding fees	300	300	300
Fines and forfeitures	25	60	50
Rent	650	1,370	1,400
Sale of permits	50	50	50
,, condemned stores	10	10	10
,, shooting licences	60	20	20
Contribution towards Dhoni-Olavakot road	250	757	775
Total revenue	**1,16,069**	**1,68,853**	**1,39,904**

Expenditure.

	1929–30.	1930–31.	1931–32.
	RS.	RS.	RS.
Expenditure on works—Ordinary	85,370	1,27,065	90,229
,, Capital	3,038	4,944	14,412
Pay of Establishment, allowances and contingencies (including Conservator)	42,589	42,589	42,589
Total expenditure	**30,997**	**1,74,598**	**1,47,230**

	RS.
Average revenue	1,41,609 per year.
Average expenditure	1,50,942 ,,

Net loss .. 9,323 per year.

766. The pay of establishment has been calculated on the basis of the average pay of officers as given in Circular D.Dis. A. No. 149/31, dated 17th February 1931, while allowances and contingencies were based on actuals. The actual pay is higher than the figures adopted as higher grade Rangers have been in charge of both Palghat and Mannarghat ranges, and as an Assistant Conservator and an Extra Assistant Conservator have been attached to the division for over one year.

767. The financial aspect of the production and sale of sleepers, etc., from the evergreen forests, and of regenerating and tending the gaps so created, appears to be sound, as may be seen from the following analysis :—

NET PROFIT ANTICIPATED FROM THE SELECTION WORKING CIRCLE (IN TEN YEARS.)

Revenue.

	RS.
By sale of sleepers	12,73,351
By kolmarams	1,54,000
By other timber	50,000
By minor produce	20,000
Total revenue ..	**14,97,351**

Expenditure.

Cost of production of sleepers	8,67,110
,, kolmarams	97,500
,, other timber	15,000
Regeneration and tending	8,250
Regeneration of cardamoms	400
Collection of minor forest produce	3,000
Fire protection	9,400
Repairs to roads	10,000
Repairs to buildings	5,000
Maintenance of boundaries	930
Experiments	2,000
Stores (saws, etc.)	3,000
Malarial prophylaxis	1,000
Proportion of establishment charges	3,25,000
Total expenditure ..	**13,47,590**

768. The probable cost value of the forests included in the Selection Working Circle, has been calculated as Rs. 2,32,713 in Chapter VII of Part I. To this must be added the capital value of roads and buildings proposed for construction in the 10-year period. This amounts to Rs. 20,150. The total cost value will then be Rs. 2,52,863.

A capital of Rs. 2,52,863 which yields a net income of Rs. 14,976 per annum produces an interest of nearly 6 per cent per annum. It is expected to produce this rate of interest after paying for the regeneration of the gaps created, which, in addition, increases the proportion of valuable species in the forest, and so enhances its potential value.

769. The anticipated gross annual revenue is Rs. 1,59,932 and the annual expenditure, Rs. 1,49,896, so that the net annual revenue is estimated to be about Rs. 10,000 which is about Rs. 19,300 higher, per annum, than the average for the last three years. The net revenue would naturally have been more favourable if the prices prevailing before the general depression had been maintained. It is generally recognized that we are at the lowest ebb of a worldwide economic crisis : we have therefore cause to be optimistic.

770. The gross revenue is Rs. 1·71 per acre and the expenditure Rs. 1·60 per acre ; the net revenue or surplus is therefore only a little over 1 anna 9 pies per acre of the area under the working plan. The expenditure is 93·7 per cent of the gross revenue.

Out of the total area of 93,680 acres under the working plan, 49,627 acres are unproductive or unworkable, and are in the Protection Working Circle. If these areas are excluded, the gross revenue will amount to Rs. 3·63 per acre, the expenditure to Rs. 3·40 per acre and the surplus to 4 annas 5 pies per acre, from workable forests. The major part of the revenue is from areas accessible with difficulty and so costly to exploit. The net revenue from such areas extending over 34,992 acres, has been estimated above to be Rs. 14,976 per annum or about 7 annas per acre. As mentioned in paragraph 764 above, expenditure has also to be incurred in tending the 'logged' areas of the Chenat Nair reserve—an unproductive item. The high proportion that expenditure bears to revenue and the small net annual revenue per acre, are explained by the facts mentioned above.

Financial Forecast.

Revenue.						Expenditure.					
Serial number.	Particulars.	Rate.	Reference to paragraph.	Amount expected to be realized.	Remarks.	Serial number.	Particulars.	Rate.	Reference to paragraph.	Amount expected to be expended.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		RS. A. P.		RS.				RS. A. P.		RS.	
					I. Selection Working Circle.						
1	By sale of *Mesua, Xylia, etc.,* sleepers—				The conversion will be mainly directed to the production of broad guage sleepers, as metre guage sleepers from distant coupes are likely to cost more than the sale value. A ratio of 10 broad guage to 1 metre guage has been allowed, however.	1	Cost of production of sleepers—				Cost of production of one broad gauge unit (type). RS. A. P Marking .. 0 0 2 Felling and conversion. 1 8 0 Dragging .. 2 4 0 Carting .. .. 0 12 0 Clamping, etc. .. 0 2 6 Miscellaneous .. 0 3 0 Total .. 4 13 8
(a)	156,853 broad guage sleepers.	7 12 0 each.	226, 473	12,15,611		(a)	165,164 broad guauge sleepers.	5 0 0 each.	219	8,25,820	
(b)	15,684 metre guage sleepers.	3 2 0 each.	226,473	49,013		(b)	16,516 metre guage sleepers. Cost of production of a broad guage sleeper was worked out for each of the 20 future coupes and the average value has been taken. A typical data sheet is given under "Remarks."	2 8 0 each.	219	41,290	
(c)	8,727 rejected broad guage units. Current rates, which are the lowest for the last four years, have been adopted.	1 0 0 each.	..	8,727							
2	By sale of kolmarams and chattams—					2	Cost of production of kolmarams and chattams—				Cost of production of an *Acrocarpus* kolmaram (type)— RS. A. P. Marking .. .. 0 0 2 Felling and conversion. 1 0 0 Dragging .. 1 0 0 Carting .. .. 0 7 0 Miscellaneous .. 0 0 10 Total .. 2 8 0
(a)	*Palaquium* and *Calophyllum* kolmaram units, 40,000.	2 8 0 each.	225,473	1,00,000	This price is likely to improve.	(a)	*Palaquium* and *Calophyllum* kolmarams, 40,000 units.	1 14 0 each.	214, 216	75,000	
(b)	*Hopea* and *Acrocarpus* kolmaram units, 9,000. Current rate for (a) is Rs. 2–5–3. Average rate for the last four years has been adopted.	6 0 0 each.	225, 473	54,000	Current rate is Rs. 6. Likely to improve.	(b)	*Hopea* and *Acrocarpus* kolmarams, 9,000 units.	2 8 0 each.	214, 216	22,500	
3	By sale of timber in logs— *Terminalia tomentosa, Terminalia paniculata* and *Lagerstroemia lanceolata* from Panakadan reserved forest, 40,000 c.ft.	1 4 0 per c.ft.	473	50,000	This area is due for felling in 1934–35, when the timber market is anticipated to improve slightly.	3	Cost of production of timber in logs and delivery at Olavakot— 40,000 c.ft. from Panakadan. Logging and felling, dragging to cart, As. 2 c.ft., carting to Olavakot As. 4 c.ft.	0 6 0 per c.ft.	..	15,000	
	II. Teak Conversion Working Circle. Elival Felling Series.										
	By sale of coupes, 140 acres at 14 acres a year. Average, Rs. 19 per acre for last three years.	25 0 0 per acre.	224, 557 to 560	3,500	Expected to improve on account of better growth.	4	Regeneration of gaps and tending artificial regeneration— 12,500 gaps out of a total of about 17,750 are expected to be regenerated.	0 8 0 a gap.	510	6,250	
5	Dhoni felling series, by sale of annual coupes, 314 acres. The average rate obtained for the last five years is Rs. 90.	90 0 0 per acre.	224, 557 to 560	28,260		5	Tending natural regeneration during marking— Two coolies at 8 annas a day, each are expected to tend 10 acres a day over an average coupe of 800 acres.	80 0 0 a coupe.	525	1.600	
6	Chindaki felling series, by sale of timber from annual coupes of 10 acres, 100 acres in all.	10 0 0 per acre.	224, 557 to 560,	1,000	Estimated.	6	Tending of natural regeneration over one-tenth of two coupes, intensively. 160 acres a year.	0 4 0 an acre,	526	400	

Revenue.						Expenditure.					
							II. Teak Conversion Working Circle. Elival felling series.				
						7	Survey and demarcation of 10 coupes, including coupe stones.	15 0 0 a coupe.	558	150	
	Panakadan felling series, by sale of timber from annual coupes of 10 acres, 100 acres in all.	15 0 0 per acre.	224, 557 to 560	1,500	Estimated	8	Formation and tending of plantations, 140 acres.	36 0 0 per acre.	606	5.040	
							Dhoni Felling Series.				
	Sale of second thinnings over 400 acres.	15 0 0 per acre.	224, 557 to 560	6,000	Based on past actuals in Dhoni Puliampalli.	9	Survey and demarcation, 4 coupes.	15 0 0 a coupe.	557	60	Six future coupes have been surveyed and demarcated by the Working Plans.
	Sale of third thinnings over 5·5 acres.	20 0 0 per acre.	224, 557 to 560	110	Estimated about 220 stems at Re. 0–8–0 each per acre.	10	Formation and tending of plantations, 25 acres a year or 250 acres.	32 0 0 per acre.	606	8,000	
	III. Fuel Working Circle.						*Chindaki Felling Series.*				
						11	Survey and demarcation of 10 coupes.	10 0 0 per coupe.	560	100	Wooden sign boards prescribed.
	By sale of annual coupes, 14 acres a year or 140 acres. Based on rates obtained for similar areas in private forests nearby.	25 0 0 per acre.	224, 619	3,500	The area is near the Olavakot Railway station. Good prices are therefore expected.	12	Fromation and tending of plantations, 100 acres.	22 0 0 per acre.	606	2,200	
							Panakadan Series.				
						13	Survey and demarcation of 10 coupe s	10 0 0 per coupe.	559	100	Wooden sign boards prescribed.
						14	Formation and tending of plantations, 100 acres.	18 0 0 per acre.	606	1,800	
	IV. Bamboo Working Circle.										
	By sale of annual courpes, one every year. The average for the last two years is Rs. 2,000. The third coupe is not likely to fetch as good a price as the first.	2,000 0 0 a year.	664	20,000	Bamboos are flowering sporadically. If there be a gregarious flowering within the period, the full amount shown here cannot be realized.	15	First thinning over 500 acres of plantations.	2 0 0 an acre.	595 to 599	1,000	Based on an average of second thinnings in old teak plantations. Includes felling and carting to sale depot.
						16	Second thinning over 400 acres.	12 0 0 an acre.	595 to 599	4,800	
						17	Third thinning over 5·5 acres.	10 0 0 an acre.	595 to 599	55	
							III. Fuel Working Circle.				
						18	Regeneration of 6 acres of paddy flats. Mound formation only. Two coolies at Re. 0–8–0 a day can make 250 mounds, so that 1,200 mounds can be made for Rs. 5 over one acre.	5 0 0 an acre.	620 to 623	30	Estimated.
							IV. Tending Working Circle.				
						19 (a)	Tending in *Hopea Artocarpus* and Mahogany plantations. 171 acres a year for 5 years.	0 8 0 an acre.	641 to 648	428	
						(b)	Climber cutting over 171 acres in 1940–41.	0 4 0 an acre.		43	
						20 (a)	Thinning in *Terminalia tomentosa* plantations, 16 acres.	0 12 0 an acre.	649	12	
						21	Tending of natural *Hopea* in Elival, 536 acres.	0 8 0 an acre.	650, 651	268	
						22 (a)	Tending in "shola and semi shola not logged intensively," 648 acres.	0 8 0 an acre.	652 to 654	324	
						(b)	Climber cutting in "shola and semi shola not logged intensively," 648 acres.	0 4 0 an acre.		162	
						23 (a)	Climber cutting deciduous forests, 2,108 acres.	0 8 0 an acre.	656 to 658	1,054	
						(b)	Climber cutting deciduous forests (second rotation).	0 4 0 an acre,	..	527	

Financial Forecast—cont.

Revenue.

Serial number.	Particulars.	Rate.	Reference to paragraph.	Amount expected to be realized.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)
		RS. A. P.		RS.	
12	Lease of minor forest produce from—				
(a)	Attapadi Blocks I to V and Panakadan. Average for last four years is Rs. 615 for Attapadi Blocks I to V. Rupees 100 a year is anticipated from Panakadan.	850 0 0 a year.	228, 675	8,500	The revenue from Attapadi Block I is expected to improve owing to the spread of cardamoms.
(b)	Attapadi Block VI. Not separately sold before.	500 0 0	228, 675	5,000	Inclusion in Palghat range, and departmental works are expected to reduce theft. Spread of cardamoms will induce good prices.
(c)	Chenat Nair and adjacent reserves—Average for the last five years is Rs. 540.	600 0 0 a year.	228, 675	6,000	
13	Sale of minor forest produce from the Silent valley. Lease for the last five years has fetched an average annual rental of Rs. 408.	1,000 0 0 a year.	228, 677	10,000	Departmental collection, cultivation of cardamoms, selection fellings inducing spread of cardamoms, and better prices are expected to bring in a higher revenues.
	VI. Miscellaneous.				
14	Rent of buildings—				
(a)	District Forest Officer ..	900 0 0 a year.	..	9,000	Average for last two years.
(b)	Others	520 0 0 a year.	..	5,200	
(c)	Rest houses	100 0 0 a year.	..	1,000	
15	Sale of permits to contactors.	100 0 0 a year.	..	1,000	Based on past averages.
16	Sale of condemned stores ..	25 0 0 a year.	..	250	
17	Compounding fees. Average Rs. 300 for last three years.	300 0 0 a year.	..	3,000	
18	Fines and forfeitures .. Average Rs. 25 for the last three years.	50 0 0 a year.	..	500	More contracts are anticipated.
19	Shooting licences—Past average.	40 0 0 a year.	..	400	Two licences a year.
20	Contribution towards repairs to Olavakkot-Dhoni road from the District Board.	775 0 0 a year.	..	7,750	
21	Refunds and drawbacks—Past average.	50 0 0 a year.	..	499	

Total Revenue	..	15,99,820
Deduct total expenditure	..	14,98,960
Net revenue for 10 years	..	1,00,860
No average surplus per year	..	10,000 approximately.

Expenditure.

Serial number.	Particulars.	Rate.	Reference to paragraph.	Amount expected to be expended.	Remarks.
(7)	(8)	(9)	(10)	(11)	(12)
		RS. A. P.		RS	
	V. Minor Forest Produce Working Circle.				
24	Collection of minor forest produce from the Silent Valley.	300 0 0 a year.	677	3,000	Lump sum.
25	Regeneration of cardamoms over 20 coupes.	20 0 0 per coupe per year.	678 to 679	400	
	VI. Miscellaneous.				
26	Fire protection—*Existing.*				
(a)	Palghat Range	500 0 0 a year.	684 to 690	5,000	
(b)	Mannarghat Range	435 0 0 a year.		4,350	
27	*New.*				
(a)	Paths in grassland in Silent Valley reserve, 10 miles.	10 0 0 a mile per year.		1,000	
(b)	Paths round Muthikulam in Attapadi Block VI, 6 miles.	8 0 0 a mile per year.		480	
(c)	North-east corner of Attapadi Block VI, 3 miles.	10 0 0 a mile per year.		300	
(d)	Round future teak plantations, 7 miles, average.	8 0 0 a mile per year.		560	
	Roads and paths.				
28	Repairs and maintenance of existing paths.	2,000 0 0 a year.	371	20,000	
29	Improvements to existing paths—				
(a)	Sappal-Muthikulam path.	150 0 0	691, 692	100	Interest on the capital of Rs. 400 for five years at 5 per cent has been added.
(b)	Sappal Elival path ..	50 0 0			
(c)	Walakad-Poonamalai path.	100 0 0			
(d)	Aruvampara-Chindaki path.	100 0 0			
(e)	Muthikulam-Pothuparapallam path.	150 0 0	691, 692	62	Interest on the capital of Rs. 250 for five years at 5 per cent has been added.
(f)	Anamulli-Chindaki path ..	100 0 0			
	New works.				
30 (a)	Pulikal Singapara path ..	500 0 0	693	2,250	**Interest at 5 per cent for five years has been added instead of the total capital expenditure of Rs. 9,000.**
(b)	Kumaramputhur-Adivaram. road.	6,000 0 0			
(c)	Palamalai path	1,300 0 0			
(d)	Pothuparapallam-Varadimalai path.	1,000 0 0			
(e)	Narasapuram-Varadimudi path,	200 0 0			
	Buildings, wells, etc.				
31	Repairs and maintenance of existing buildings.	1,000 0 0 a year.	372	10,000	
	Improvement or reconstruction.				
32	Nilikal upper serambi, to be reconstructed.	500 0 0	694	..	Interest at 5 per cent on the total capital expenditure of Rs. 10,500, for 5 years, has been added.
33	*New works.*				
(a)	Singapara Serambi and outhouses.	2,500 0 0 each.	694	2,625	
(b)	Varadimudi serambi and outhouses.				
(c)	Aruvampara serambi and outhouses.				
(d)	Pothuparapallam serambi and outhouses.				
	Maintenance of boundaries.				
34	31 miles, once in 3 years ..	10 0 0 a mile per year.	706	930	Will be done three times.
35	Experiments	300 0 0 a year.	698, 699, 703, 709 to 712, 714.	3,000	Lump sum.
36	Stores, tools and plant—				
(a)	Repairs and replacements. Average for Palghat and Mannarghat Ranges for the last 4 years (except saws) is Rs. 100 a year.	100 0 0 a year.	717	1,000	
(b)	Purchase of saws and replacements.	300 0 0 a year.		3,000	Based on previous purchases.
37	Malarial prophylaxis ..	100 0 0 a year.	728	1,000	
	VII. Establishment.				
38	Mannarghat Range—		755, 756	98,840	Average pay of establishment calculated as per Circular D. Dis. No. A. 149/31, dated 17th February 1931. Other charges are actual averages over 4 years.
	Pay	7,524 0 0			
	Fixed Travelling allowance.	700 0 0			
	Conveyance allowance ..	60 0 0			
	Travelling allowance ..	1,500 0 0			
	Contingencies	100 0 0			
		9,884 0 0 a year.			
39	Palghat Range—			72,700	Two-thirds of Ranger plus actual establishment over working plan area have been admitted. Two-thirds of other average charges over 3 years, admitted.
	Pay	5,784 0 0			
	Fixed Travelling allowance.	516 0 0			
	Conveyance allowance	120 0 0			
	Travelling allowance ..	780 0 0			
	Contingencies	70 0 0			
		7,270 0 0 a year.			
40	Bolampatty Range—Expected to produce about 12,000 broad guage units, during the period of plan.	12,000 0 0 for ten years.	755, 756	12,000	Palghat and Mannarghat ranges produce 8,000 broad gauge units per year and their establishment charges work out to about Re. 1 per sleeper produced. Hence Re. 1 per sleeper has been adopted.
41	*District Forest Office*—				
	Pay of Officers (1 Indian Forest Service and 1 Provincial Forest Service Officer allowed).	18,528 0 0			
	Pay of establishment ..	6,114 0 0			Average of past four years.
	Travelling allowance ..	3,813 0 0			
	Rent	893 0 0			
	Contingencies	1,506 0 0			
		30 854 0 0			
	Two-thirds allotted to working plan area.	⅔ × 30,854 = 20,569 0 0 per year.		2,05,690	
42	Conservator, Ootacamund Circle.	3,666 0 0 per year.	..	36,660	Two-thirds of one-eighth of Rs. 44,000 per annum has been allotted.
	Total Expenditure ..			14,98,960	

SECTION 2.—THE COST OF THE PLAN.

771. The working plan has cost Rs. 77,481 as detailed below :—

	RS.	A.	P.
Pay of Working Plan Officer	27,766	9	0
Pay of establishment	23,688	0	0
Travelling allowances	13,280	2	0
Compensatory allowances	551	9	0
Contingencies	647	7	0
Supplies and services	135	0	0
Field work	12,912	5	3
	78,981	**0**	**3**
Deduct amount charged to the Palghat Division for marking trees in the Silent Valley, vide Reconnaissance report ..	1,500	0	0
Cost of the plan	**77,481**	**0**	**3**

SECTION 3.—STATEMENT OF OPERATIONS UNDER THE PLAN.

772. A statement showing all the operations prescribed under this plan, with the officer responsible for carrying out each of them, is given below :—

Statement of operations to be carried out every year in the different working circles.

Year.	Selection Working Circle.					Teak Conversion Working Circle.					
	Marking cum tending.	Felling.	Regeneration.	Tending.	Special tending.	Felling.	Regeneration.	Weeding.	Pruning and cutting back.	First thinning.	Second or third thinning.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1933–34	S.V.C. VII Att. C. V.	S.V.C. VI Att. C. IV	S.V.C. V Att. C. III	S.V.C. IV Att. C. II	1/10 of CX 1/10 of CY	E. VII D. VI C. I P. I	E. VI D. V	E. V D. IV E. VI D. V.	E. V D. IV		
1934–35	S.V.C. VIII Att. C. VI	S.V.C. VII Att. C. V	S.V.C. VI Att. C. IV	S.V.C. V Att. C. III	1/10 of CX 1/10 of CY	E. VIII D. VII C. II P. II	E. VII D. VI C. I P.I	E. VI D. V E. VII D. VI	E. VI D. V	E. I D. 1928	
1935–36	S.V.C. IX Att. C. VII	S.V.C. VIII Att. C. VI	S.V.C. VII Att. C. V	S.V.C. VI Att. C. IV	1/10 of CX 1/10 of CY	E. IX D. VIII C. III P. III	E. VIII D. VII C. II P. II	E. VII D. VI C. V P. I E. VIII D. VII	E. VII D. VI C. I P. I	E. II D. I	
1936–37	S.V.C. X Att. C. VIII	S.V.C. IX Att. C. VII	S.V.C. VIII Att. C. VI	S.V.C. VII Att. C. V	1/10 of CX 1/10 of CY	E. X D. IX C. IV P. IV	E. IX D. VIII C. III P. III	E. VIII D. VII C. II P. II D. VIII	E. VIII D. VII C. II P. II	E. III D. II	D. 1918.
1937–38	S.V.C. XI Att. C. IX	S.V.C. X Att. C. VIII	S.V.C. IX Att. C. VII	S.V.C. VIII Att. C. VI	1/10 of CX 1/10 of CY	E. XI D. X C. V P. V	E. X D. IX C. IV P. IV	E. IX D. VIII C. III P. III E. X D. IX	E. IX D. VIII C. III P. III	IV D. III	D 1919. E. 1919.
1938–39	S.V.C. XII Att. C. X	S.V.C. XI Att. C. IX	S.V.C. X Att. C. VIII	S.V.C. IX Att. C. VII	1/10 of CX 1/10 of CY	E. XII D. XI C. VI P. VI	E. XI D. X C. V P. V	E. X D. IX C. IV P. IV E. XI D. X	E. X D. IX C. IV P. IV	E. V D. IV	
1939–40	S.V.C. XIII Att. C. XI	S.V.C. XII Att. C. X	S.V.C. XI Att. C. IX	S.V.C. X Att. C. VIII	1/10 of CX 1/10 of CY	E. XIII D. XII C. VII P. VII	E. XII D. XI C. VI P. VI	E. XI D. X C. V P. V E. XII D. XI	E. XI D. X C. V P. V	E. VI D. V	
1940–41	S.V.C. XIV Att. C. XII	S.V.C. XIII Att. C. XI	S.V.C. XII Att. C. X	S.V.C. XI Att. C. IX	1/10 of CX 1/10 of CY	E. XIV D. XIII C. VIII P. VIII	E. XIII D. XII C. VII P. VII	E. XII D. XI C. VI P. VI E. XIII D. XII	E. XII D. XI C. VI P. VI	E. VII D. VI C. I P. I	E. I. D. 1928.
1941–42	S.V.C. XV Att. C. XIII	S.V.C. XIV Att. C. XII	S.V.C. XIII Att. C. XI	S.V.C. XII Att. C. X	1/10 of CX 1/10 of CY	E. XV D. XIV C. IX P. IX	E. XIV D. XIII C. VIII P. VIII	E. XIII D. XII C. VII P. VII E. XIV D. XIII	E. XIII D. XII C. VII P. VII	E. VIII D. VII C. II P. II	E. II. D. I.
1942–43	S.V.C.	S.V.C. XV Att. C. XIII	S.V.C. XIV Att. C. XII	S.V.C. XIII Att. C. XI	1/10 of CX 1/10 of CY	E. XVI D. XV C. X P. X	E. XV D. XIV C. IX P. IX	E. XIV D. XIII C. VIII P. VIII E. XV D. XIV	E. XIV D. XIII C. VIII P. VIII	E. IX D. VIII C. III P. III	E. III. D. II. D. 1918. (third thinning).
Officer responsible for each work.	Forester checking by Range officer and District Forest Officer or Assistant.	Forester	Forester	Forester	Ranger supervised by District Forest Officer or Assistant.	Contractor supervised by Forester.	Forester	Forester	Forester	District Forest Officer or Assistant.	Ranger checked by District Forest Officer or Assistant

Note.—S.V.—Silent Valley; Att.—Attapadi; E.—Elival; D.—Dhoni; C.—Chindakki; P—Panakadan.

Statement of operations to be carried out every year in the different working circles—cont.

Year.	Fuel Working Circle.				Tending ~~Felling~~ Working Circle.				Minor Forest produce working circle.	Bamboo working circle.
	Felling.	Regeneration.	Cleaning and climber cutting.	Weeding.	Letting in overhead light.	Thinning and pruning.	Tending.	Climber cutting.	Cardamom planting.	To be leased out to contractor.
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1933–34	Coupe I	Coupe I	Coupe I	Coupe I	*Mesua*, *Artocarpus* and mahogany plantation series. Series No. 1.	*Terminalia* plantation series. Series No. II.	Coupe A of series 3 Elival natural Hopea and Coupe I of series No. 4 Shola and semi shola series.	Coupe I of series No. 6. Deciduous forest series.	C. IV. S.V.C. II. Att.	C. III.
1934–35	Coupe II	Coupe II	Coupe II	Coupe I Coupe II	Whole of series No. 1.	..	Coupe B of series No. 3 and Coupe II of series No. 4.	Coupe II of series No. 6.	C.V.S.V. C. III. Att.	C. I.
1935–36	Coupe III	Coupe III	Coupe III	Coupe I Coupe II Coupe III.	Whole of series No. 1.	..	Coupe C of series No. 3 and Coupe III of series No. 4.	Coupe III of series No. 6.	C. VI. S.V.C. IV. Att.	C. II.
1936–37	Coupe IV	Coupe IV	Coupe IV	Coupe II Coupe III Coupe IV.	Whole of series No. 1.	..	Coupe IV of series No. IV and part of series No. 3.	Coupe IV of series No. 6 and whole of series No. 2.	C. VII. S.V.C. V. Att.	C. III.
1937–38	Coupe V	Coupe V	Coupe V Coupe I	Coupe III Coupe IV Coupe V	Whole of series No. 1. ..	.. ..	Coupe V of series No. 4 and part of series No. 3.	Coupe V of series No. 6 ..	C. VIII. S.V.C. VI Att.	C. I.
1938–39	Coupe VI	Coupe VI	Coupe VI Coupe II.	Coupe IV Coupe V. Coupe VI.	..	..	..	No. 3 series, Coupe I of series No. 4, Coupe No. 1 of series No. 6.	C. IX. S.V.C. VII. Att.	C. II.
1939–40	Coupe VII	Coupe VII	Coupe VII Coupe III	Coupe V Coupe VI	..	..	..	Series No. 2, series No. 3. Coupe II of series No. 4, Coupe II of series No. 6.	C. X. S.V.C. VIII. Att.	C. III.
1940–41	Coupe I	Coupe I Coupe IV.	Coupe I Coupe IV.	Coupe VI	..	..	..	Series No. 1, series No. 3. Coupe III of series No. 4, Coupe III of series No. 6.	C. XI. S.V.C. IX. Att.	C. I.
1941–42	Coupe II	..	Coupe II Coupe V.	..	..	..	..	Series No. 3, Coupe IV of series No. 4, Coupe IV of series No. 6.	C. XII. S.V.C. X. Att.	C. II.
1942–43	Coupe III	..	Coupe III Coupe VI.	..	..	..	..	Series No. 2, series No. 4. Coupe V of series No. 4, Coupe V of series No. 6.	C. XIII. S.V.C. XI. Att.	C. III.
Officer responsible for each work.	Contractor supervised by Forester.	Forester	Forester	Forester	Ranger supervised by District Forest officer or Assistant.	Ranger supervised by District Forest Officer or Assistant.	Ranger	Forester	Forester	Contractor supervised by forester.

Note.—S. V.—Silent Valley; Att.—Attapadi; E.—Elival; D.—Dhoni; C.—Chindakki P.—Panakadan.

CHAPTER XII.—SUMMARY OF PRESCRIPTIONS.

PART I.

GENERAL FACTS.

	PARA.	PAGE
1 *Area and distribution.*—The working plan covers an area of 93,680 acres, comprising the Silent Valley, Panakadan and Attapadi Blocks I to V of Mannarghat range; Chenat Nair, Dhoni, Puliyampalli Tope and Thampurattipottai reserves of Palghat range; and Attapadi Block VI and part (shola) of Bolampatti Block II of Bolampatti range	23 and 24	6
2 *Main forest types.*—The total area includes—(*a*) 32,335 acres of workable shola (evergreen) forests, (*b*) 12,144 acres of workable deciduous forests, and (*c*) 49,201 acres of unworkable evergreen and deciduous forests, grass and rock	426 to 432	107, 108
3 *Growing stock.*—In the workable evergreens the most important species, from the point of view of extraction, is *Mesua ferrea.* The average incidence of this species in first quality areas is 3·2 per acre, of all trees 12″ and above in diameter, and 0·66 per acre, of trees of and above a girth of 7′ 6″ at breast height. In second quality areas, the incidence is 6·8 per acre of all trees of and above 12″ in diameter and 1·7 per acre, of trees of and above 6′ 6″ in girth	443	111
Rosewood (*Dalbergia latifolia*) of large size occurs in considerable numbers in the workable deciduous forests of Attapadi Blocks I to V, while *Xylia xylocarpa* is the most widely prevalent and the most economically important species in other deciduous areas	49 to 52	10, 11
4 *Division into compartments.*—The workable evergreen and deciduous forests have been divided into 64 compartments, one series in Mannarghat range and the other in Palghat and Bolampatti ranges.		
The average area of a compartment in the Silent Valley series is 783 acres, while that of one in the Attapadi series is 393 acres.	439, 440 and 636	110, 151

PART II.

OBJECTS OF MANAGEMENT.

5 *Shola forests.*—In the workable shola (evergreen) forests, the object is to exploit merchantable timber in such a manner as not to endanger their evergreen character and so as to improve the proportion of valuable species in them; in sholas 'logged' by American methods of exploitation, the object is to improve the natural and artificial regeneration of the valuable species. Sholas not fit for working will be preserved for climatic reasons.	423	107
6 *Deciduous forests.*—In the workable deciduous forests, the object is to replace the existing poorly grown or exploited stock by plantations of teak, *Dalbergia latifolia*, *Pterocarpus marsupium* and *Artocarpus hirsuta*, in suitable localities, and to obtain the maximum sustained yield per acre in other places; in 'logged' areas, the existing natural and artificial regeneration will be improved. Areas not fit for working will be protected	423	107

METHODS OF TREATMENT.

7 *Workable shola forests.*—These areas will be worked by light selection fellings of mature and overmature trees and the gaps created will be artificially regenerated if natural regeneration is deficient	424	107
8 *Deciduous forests fit for planting.*—Areas in deciduous forests suitable for concentrated regeneration will be clearfelled and regenerated artificially	424	107

	PARA.	PAGE
9 *Deciduous areas fit for fuel only.*—Areas fit only for growing fuel will be worked under the pure coppice system	424	107
10 *Other deciduous areas.*—All other workable areas in the deciduous forests will be worked by selection fellings and regenerated artificially in gaps	424	107
11 '*Logged*' *areas.*—In areas 'logged' under American methods, the natural regeneration of valuable species, and the existing plantations, will be tended by climber cuttings and admission of overhead light	424	107
12 *Bamboos.*—Bamboo coupes will be leased out on a 3 year rotation	424	107
13 *Minor produce.*—Minor forest produce will be leased out in suitable blocks except from the Silent Valley reserve, from which they will be collected departmentally. Cardamom will be introduced into gaps created by fellings in the sholas where they fail to appear spontaneously. Experiments on the cultivation of lac on *Schelichera trijuga* trees will be continued ..	424	107
14 *Unworkable forests.*—Forests which are unworkable or inaccessible will be protected, except for the collection of minor forest produce	424	107

WORKING CIRCLES.

	PARA.	PAGE
15 *The seven working circles.*—There will be seven working circles :— 1 The Selection Working Circle, covering an area of 34,992 acres, 2 The Teak Conversion Working Circle, area 2,706 acres, 3 The Fuel Working Circle of 131 acres, 4 The Tending Working Circle of 8,299 acres, 5 The Bamboo Working Circle of 4,039 acres, 6 The Minor Produce Working Circle of 90,306 acres, and 7 The Protection Working Circle, covering an area of 49,627 acres	425	107

THE SELECTION WORKING CIRCLE.

	PARA.	PAGE
16 *Constitution and area.*—The total area of 34,992 acres is composed of 30,120 acres of shola and 4,782 acres of deciduous forests ..	426	107
17 *Compartments.*—The area has been divided into 55 compartments.	440	110
18 *Analysis of the crop.*—In the shola forests, the following eight associations have been distinguished on the maps :— 1 *The Cullenia-Palaquium* association, 2 *The Palaquium-Mesua* association, 3 *The Poeciloneuron-Palaquium* association, 4 *The Mesua-Calophyllum* association, 5 *The Cullenia-Mesua* association, 6 *The Vateria-Cullenia* association, 7 *The Reed-Calophyllum* association, and 8 *The Reed-Poeciloneuron* association	65 to 99, 446 and 448	12–16, 112
Compartments or sub-compartments have been allotted to the various associations	447	112
In the deciduous forests, the most important species prevailing over a particular locality have been suitably indicated on the maps	449	112
19 *Valuation of the crop.*—Merchantable species over 12″ in diameter at breast height have been enumerated in 4″ diameter classes over 50 per cent of the area of all compartments except compartments 28, 29, 30 and 31. Some compartments have been completely enumerated	398 to 402, 442 and 443	85, 86, 111
20 *Silvicultural system.*—The silvicultural system prescribed is a modified selection system, followed by the artificial regeneration of such of the gaps created by fellings as are above a minimum size but do not contain sufficient natural regeneration of the valuable species	451	113
21 *Quality classes.*—Two quality classes have been recognized for *Mesua ferrea* and *Dalbergia latifolia*	452 to 454	113

	PARA.	PAGE
22 *Exploitable girth.*—The minimum exploitable girth (at breast height, over bark) for first quality *Mesua ferrea* and for all other species, except *Xylia xylocarpa*, will be 7′ 6″, for the first felling cycle. For second quality *Mesua ferrea* it will be 6′ 6″ and for *Xylia xylocarpa*, 6′, for the first felling cycle	455 to 462	113 to 115
23 *Felling series.*—There will be two felling series : the Silent Valley Felling series of 18,800 acres, and the Attapadi Felling series of 16,192 acres	463	115
24 *The felling cycle.*—The Primary felling cycle will be fifteen years for the Silent Valley Felling series : of this, five years will have elapsed by the end of 1932–33. For the Attapadi Felling series, the primary felling cycle will be thirteen years, of which three years will have elapsed by the end of 1932–33	464	115
25 *The yield.*—Only the probable yield of railway sleepers from *Mesua ferrea, Dalbergia latifolia, Xylia xylocarpa* and teak, has been estimated. Of these, *Mesua ferrea* will form the predominant portion	465	116
The Silent Valley series is expected to yield 84,857 and the Attapadi series 79,838 passed broad gauge units in the next ten years—the balance of the first felling cycle	..	118
26 *The regulation of the yield and the annual coupes.*—The yield is regulated by area. The areas of the annual coupes have been adjusted so that they are approximately equiproductive with reference to the yield of railway sleepers.		
The probable average annual gross yield from both the series together is 110,000 cubic feet which is 2·6 per cent of the growing stock above 12″ in diameter.		
The probable average annual yield of passed broad guage sleeper units from both the series is 16,470, in approximately equal numbers from each	465 to 473	116, 117
27 *Extraction map.*—An extraction map to a scale of 8″ = 1 mile will be prepared in advance of marking	476	120
28 *Extraction scheme.*—An extraction scheme showing routes and depots on the extraction map should be prepared on the completion of marking	477	120
29 *Marking Rules.*—Rules to regulate the marking are prescribed in paragraph 479. The marked trees should be located on the extraction map. Not less than 10 per cent of the marking should be checked and certified to by the District Forest Officer or his gazetted assistant	479	120
30 *Felling, conversion and extraction.*—Contractors should be encouraged to take up felling, conversion and extraction. Rules to be observed in felling are prescribed. The conversion will normally be into broad gauge sleepers, kolmarams and chattams, as the case may be, of dimensions slightly larger than approved specifications, in order to allow for drag holes and wear and tear. The material will be dragged down from stump site to heads of cart-tracks, normally	480 to 483	121, 122
31 *Species suitable for regeneration in sholas. Acrocarpus fraxinifolius, Artocarpus hirsuta, Mesua ferrea, Gluta travancorica, Dysoxylum malabaricum* and *Hopea parviflora* will be introduced in the gaps created in the sholas	485	122
32 *Species to be regenerated in deciduous areas.*—Teak, *Dalbergia latifolia, Pterocarpus marsupium* and *Artocarpus hirsuta* will be introduced in deciduous gaps	485	122
33 *Selection of gaps for regeneration.*—All gaps in deciduous forests will be regenerated. In the sholas gaps above a minimum size of 200 square yards and not less than 10 yards in breadth, will be regenerated if deficient in valuable natural regeneration.	492 to 497	123

	PARA.	PAGE
34 *Seed collection and treatment* (sholas).—The seeds of *Acrocarpus* may require to be treated with sulphuric acid, the fruits of *Dysoxylum malabaricum* may be saved from vermin by isolating the crown of the mother tree and protecting its trunk by thorns. Trees of *Dysoxylum* and *Acrocarpus* should not be felled if conveniently situated for seed collection	498 to 504	124
35 *Nursery.*—Nurseries for raising seedlings of *Mesua ferrea, Dysoxylum malabaricum* and *Artocarpus hirsuta* are prescribed. The beds of *Mesua* and *Dysoxylum* may have to be protected against vermin by palisades or wire netting	505 to 509	124, 125
36 *Staking and soil preparation* (sholas).—The staking will be at an espacement of 4′ × 4′ but if the total expenditure on regeneration and tending exceed eight annas a gap, the espacement may be increased to 6′ × 6′ in order to keep within this limit. The soil at each stake will be loosened to a depth of 9″ over a square foot	510 and 511	125
37 *Allotment of gaps for species* (sholas).—The largest gaps will be allotted for the introduction of *Acrocarpus* and *Artocarpus* in their centres, the periphery being reserved for shade bearing species. In smaller gaps, the centres will be reserved for *Mesua ferrea,* the other species being placed round the periphery ..	512	125
38 *Method of regeneration* (shola).—*Mesua* and *Dysoxylum* will be raised by planting out one-year old seedlings; *Artocarpus hirsuta* by dibbling and stump planting; other species by dibbling	513	125
39 *Dibbling.*—Dibbling should be completed as early as possible in May	514	125
40 *Planting.*—Planting of stumps should be completed as in the case of dibbling, but seedlings should be planted out as soon as the south-west monsoon has set in	515	125
41 *Experiments.*—Experiments have been prescribed to decide whether *Mesua* and *Dysoxylum* can be successfully grown from deep dibblings or dibblings in fenced patches and whether sowing *Mesua* after the monsoon is not better than before it. Experimental burning of gaps in sholas has also been prescribed.	516 and 517	126
42 *Allotment of gaps for species (deciduous)*—Teak will be introduced in the centre of the largest gaps below 3,000′. In the periphery of these gaps and in gaps too small for teak or above 3,000′ in elevation, *Dalbergia latifolia, Pterocarpus marsupium* and *Artocarpus hirsuta* will be grown	518	126
43 *Burning.*—The gaps (deciduous) will be burnt thoroughly between January and March	519	126
44 *Staking and soil preparation.*—These will be carried out in the same manner as has been prescribed for the sholas	520	126
45 *Dibbling and planting.*—Teak and *Artocarpus hirsuta* will be raised from stumps; the other species by dibbling	521	127
46 *Casualties* (shola and deciduous).—In the first year casualties will be replaced till the end of October, as they occur. Casualties in the second year will be replaced in gaps showing a survival of less than 75 per cent of the patches	522	127
47 *Tending of artificial regeneration.*—Weeding should be completed in the first year by the end of October. In the second year the plants will be tended twice, once early in the monsoon and again at the end of it	523	127
48 *Tending of natural regeneration in gaps.*—Natural regeneration of the valuable species in all the gaps will be tended for two years.	524	127
49 *Tending of natural regeneration in unfelled parts of the coupe.*—Natural regeneration of valuable species will be tended, as far as possible, over the whole coupe during the time of marking, when climbers will be cut. In addition, over one-tenth of the area of a selected coupe in each of the two felling series, it will be tended intensively in the manner prescribed	525 and 526	128

	PARA.	PAGE
50 *Consultation with the Provincial Silviculturist.*—The Provincial Silviculturist must be frequently consulted in connexion with all regeneration and tending	527	128
51 *Inspection paths.*—Temporary and permanent inspection paths are prescribed	528	128
52 *Demarcation.*—Coupes and tended areas will be demarcated by cut lines 15′ wide and sign boards	529	128
53 *Control.*—The Control Book, the Record of Works, the Abstract of Annual Revenue and Expenditure, the Nursery Ledger, the Regeneration Ledger with gap list, and Control maps will be maintained	530	129

THE TEAK CONVERSION WORKING CIRCLE.

	PARA.	PAGE
54 *Constitution and area.*—Deciduous areas suitable for clearfelling and planting with teak have been selected in Chenat Nair, Puliampalli tope, Attapadi Blocks I to IV and V, Dhoni and Panakadan reserves. Their total extent is 2,706 acres ..	532	131
55 *Felling series.*—Four felling series have been formed—Elival, Dhoni, Chindaki and Panakadan	542	132
56 *Silvicultural system.*—The system will be clearfelling followed by concentrated artificial regeneration	544	133
57 *Choice of species.*—Teak will be the principal species. In Chindaki and Elival series, where teak will be grown on a long rotation, the auxiliary species will be *Dalbergia latifolia, Pterocarpus marsupium* and *Artocarpus hirsuta*. In Dhoni and Panakadan series, an underwood of *Xylia* will be attempted. The planting of " mahogany " is prescribed as an experimental measure ..	545 to 548	133, 134
58 *Exploitable size and rotation.*—Teak of large size will be grown in the Chindaki and Elival series ; a rotation of 70 years has been fixed tentatively. Teak poles of an average girth of 24 inches will be grown in the Dhoni and Panakadan series : a rotation of 25 years has been fixed tentatively	549 to 551	134
59 *Coupes.*—The areas of the annual coupes in each of the four series will approximately be :—Elival 14 acres, Dhoni 32 acres, Chindaki and Panakadan, each 10 acres	552	135
60 *The yield.*—The yield is fixed by area	553 to 556	135, 136
61 *Method of executing the fellings.*—The coupes in Dhoni and Elival will be sold by auction. In Chindaki and Panakadan the coupes will be worked departmentally if they cannot be leased.	557 to 560	136
62 *Regeneration.*—Teak will be the primary species raised in all the series. In the Elival and Chindaki series, it will be raised along with a mixture of *Dalbergia latifolia, Pterocarpus marsupium* and *Artocarpus hirsuta*, and as an experiment, with *Swietenia macrophylla*. In the Panakadan and Dhoni series, a mixture of adventitous tree species and an underwood of *Xylia xylocarpa* will be aimed at	561 to 564	137
63 *Seed collection and treatment.*—The quantities of seeds to be collected and their subsequent treatment have been set forth	565 to 567	137, 138
64 *Nursery.*—Nurseries for raising stumps of teak and *Artocarpus hirsuta* have been prescribed. The technique of raising seedlings in nurseries and the size of nursery required, have been given : a nursery ledger has been prescribed	568 to 572	138, 139
65 *Cutting and burning.*—In the Dhoni and Elival series, the coppice shoots will be cut back, heaped and burnt, in lines if necessary, departmentally. In the Chindaki and Panakadan series, the kumridars will cut and burn all slash, under supervision. All burning should be completed before the end of March	573 and 574	139
66 *Staking and soil preparation.*—The espacement will be 6′ × 6′ for all series. The lining will be accurately done : stakes 3′ high should be used at every point. The soil will be loosened 6″ deep at each stake, in an 18″ square. Experimentally, one acre in each of the Dhoni and Elival series will have the soil at each stake dug up to a depth of one foot	575 to 578	139

		PARA.	PAGE
67	*Dibbling.*—In the Elival and Chindaki series, the mixture will be obtained by dibbling *Dalbergia latifolia* and *Pterocarpus marsupium*, in the same patch as the teak, but at one corner of the 18″ square. *Artocarpus* will be mixed by planting stumps. The first line of stakes will be dibbled with *Dalbergia*, the second line with *Pterocarpus* ; and between the third and fourth lines, the *Artocarpus* stumps will be planted in quincunx. The dibbling should be done by the middle of May	579 and 580	139, 140
68	*Planting.*—One year old teak stumps will be planted in crow bar holes at each stake in all series. One to three year old stumps of *Artocarpus hirsuta* will be planted in quincunx between the third and fourth lines of teak, in the Chindaki and Elival series. Planting should be completed by the middle of June, normally, but the Provincial Silviculturist should be consulted.	581 to 583	140
69	*Casualties.*—Casualties in the first monsoon will be replaced as they occur till the end of September, by teak and *Artocarpus* stumps, and seedlings of the auxiliary species. In the second year, solitary casualties will be replaced by *Artocarpus* stumps, groups by teak or *Artocarpus*, and swamps by *Terminalia tomentosa*. In the third year no casualties will be normally replaced	584 to 586	140
70	" *Kumri* ".—In the Chindaki and Panakadan series, the teak will be raised amongst field crops. The conditions under which this may be done have been prescribed. The kumridars will be permitted to cultivate an area for one year only. If ' kumri ' operations cannot be undertaken the planting will be done departmentally as in the other series	587 to 590	141
71	*Weeding.*—In the Chindaki and Panakadan series the first year's weeding will be done by the kumridars. In the Dhoni and Elival series, continuous weeding will be followed by scraping in the first year. In the second year two or three weedings may be found necessary, and probably none in the third. Natural regeneration of tree species shall not be cut at any time except under the orders of the District Forest Officer or his assistant	591 to 593	141, 142
72	*Pruning and cutting back.*—These operations will be conducted along with the first weeding of the second year	594	142
73	*Cleanings and thinnings.*—The first thinning will be conducted in the sixth year, primarily with the object of regulating the mixture of subsidiary and adventitous species. Subsequent thinnings are prescribed in the twelfth and eighteenth years ..	595 to 600	142
74	*Underwood.*—Experiments have been prescribed with a view to increase the underwood of *Xylia xylocarpa*, in plantations of the Panakadan and Dhoni series	601 and 602	143
75	*Fire protection.*—All plantations will be protected by cleared lines 20′ broad, and intermediate lines 15′ broad	603	143
76	*Inspection paths.*—Paths running along the middle contours of plantations will be kept clear to a width of 6′	604	143
77	*Demarcation.*—Stone pillars or wooden sign boards will indicate the year of formation of a plantation	605	143
78	*Cost of formation.*—The approximate costs of formation have been estimated at Rs. 32 to Rs. 36 per acre for areas regenerated departmentally, and at Rs. 18 to Rs. 22 per acre for areas regenerated along with field crops	606	144
79	*Control.*—The Control Book, Record of Works, Annual Summary of Revenue and Expenditure, Nursery Ledger, Regeneration Ledger, Compartment History and Control maps have been prescribed for maintenance	607	144

THE FUEL WORKING CIRCLE.

80	*Constitution and area.*—The Thampurattipottai reserve of 130·4 acres is the only area under this working circle	609 and 610	146
81	*Analysis and valuation of the crop.*—The total number of teak trees over 2′ in girth are 94, on the area. No other valuation has been made.		

		PARA.	PAGE
82	*Silvicultural system.*—The simple coppice system is prescribed	614	146
83	*Exploitable size.*—Fuel of an average girth of 12″ will be grown	615	147
84	*Rotation.*—A rotation of seven years is adopted	616	147
85	*Yield.*—The yield will be regulated by area	617	147
86	*Coupes.*—The non-rocky area of 101·4 acres has been divided into seven coupes of approximately equal area	618	147
87	*Fellings.*—The coupes will be auctioned and the lease will be restricted to five months, January to May. The trees will be felled flush with the ground, no " re-coppicing " of stools will be permitted, all lantana should be uprooted by the lessee.	619	147
88	*Regeneration.*—Six acres of paddy flats included in the reserve will be regenerated with *Terminalia tomentosa, Eugenia jambolana* and *Lagerstrœmia flos-reginæ*, areas coming within a coupe being taken up for regeneration in the year of felling	620	147
89	*Staking and soil preparation.*—The blank paddy field will be staked approximately 6′ × 6′, and a mound heaped up at least 9″ high at each stake. The bunds of the fields will be broken up to facilitate drainage	621	148
90	*Seed collection and treatment.*—These have been described	622	148
91	*Dibbling and notching.*—One-third of the stakes will be dibbled with *Eugenia* seeds, another third with seeds of *Lagerstrœmia flos-reginæ*, and the rest notched with *Terminalia tomentosa*. The dibbling should be completed before the break of the monsoon but the notching should only be done as soon as the monsoon has established itself	623	148
92	*Weeding.*—Lantana will be uprooted. The subordinates will keep the plants well weeded, free of cost, for the first three years	624	148
93	*Casualties.*—Casualties will be replaced as they occur, in the first year	625	148
94	*Cleaning and climber cutting.*—A cleaning is prescribed between October and December of the year of felling. Climbers will be cut in each coupe, by the subordinates, in the fourth year	626	148
95	*Control.*—The Control Book, Record of Works and the Control Journal will be maintained	628	150

THE TENDING WORKING CIRCLE.

96	*Area and constitution.*—This working circle is confined to the 'logged' areas of the Chenat Nair reserve, covering an area of 8,299 acres. Several plantations of *Hopea, Artocarpus hirsuta, Swietenia macrophylla* and *Terminalia tomentosa* are included in it	629	150
97	*Division of the area.*—Six tending series have been formed	636 to 639	151, 152
98	(*a*-1) *Treatment of Hopea and Artocarpus*, 70·3 acres.—These will be tended for five years by gradual opening of the canopy. Climbers will then be cut every third year	641 to 643	152
99	(*a*-2) *Treatment of Mahogany plantations*, 100·4 acres.—These will be tended in the same manner as the *Hopea*, except for two plantations over which overhead cover has been completely removed. The plantations without overhead cover will be thinned	644 to 648	152
100	(*b*) *Treatment of Terminalia tomentosa plantations*, 16 acres.—These will be thinned in 1933 and side branches pruned. Climbers will then be cut every third year	649	152
101	(*c*) *Treatment of the Elival natural Hopea*, 536 acres.—This area has been divided into five coupes, one of which will be tended every year, in the prescribed manner. Thereafter, climbers will be cut along with the adjoining areas	650 and 651	153

		PARA.	PAGE
102	(*d*) *Treatment of shola and semi-shola not intensively logged*, 648 acres.—Areas coming under this type have been divided into five coupes: natural regeneration of valuable species will be tended in one coupe every year in the manner prescribed. Thereafter climbers will be cut on a five-year rotation	652 to 654	153, 154
103	(*e*) *Treatment of heavily-logged shola*, 1,051 acres.—The Provincial Silviculturist will be consulted as to the possibility of undertaking experiments to determine the best way of tending the natural regeneration in it	655	154
104	(*f*) *Treatment of the deciduous forest*, 6,600 acres.—An area of 4,492 acres will not be tended during the period of this plan. The balance has been divided into five coupes, over one of which climbers will be cut every year on a five-year rotation ..	656 to 658	154
105	*Control.*—The Record of Works and Compartment History will be maintained	660	156

THE BAMBOO WORKING CIRCLE.

106	*Area and constitution.*—This working circle covers an area of 4,039 acres over which bamboo occurs in the Chenat Nair Reserve. Both *Bambusa* and *Dendrocalamus* prevail	661 and 662	156
107	*Rotation and coupes.*—The rotation will be three years and the area has been divided into three coupes, in the Kalladikode, Sappal and Elival valleys, respectively	664	156
108	*Treatment.*—One coupe will be leased out each year. All bamboos, except those which are one year old or less, will be cut and removed from the northern half of a clump in the first rotation, leaving the southern half untouched; the southern half will be felled similarly in the *second* rotation, leaving the northern half untouched, and so on *ad lib*	665	156
109	The control records will be maintained along with those prescribed for the Minor Produce Working Circle	667	157

THE MINOR FOREST PRODUCE WORKING CIRCLE.

110	*Area and constitution.*—The whole area under this plan, except the Bolampatty Block II, is covered by this working circle ..	668	157
111	*Blocks.*—The following blocks facilitate management :— 1 The Silent Valley, 2 Attapadi Blocks I to V, Panakadan and Panakadan extensions, 3 The Chenat Nair, Dhoni, Puliampalli tope and Thampuratti-pottai reserves, and 4 Attapadi Block VI	669 to 674	157
112	*Exploitation.*—The right to collect all specified minor produce will be leased out annually by public auction in each of the blocks 2, 3 and 4 described above, with the exception of reeds and fodder grass from the Chenat Nair Reserve. These latter will be sold under headload tickets. In order to control fires and to obtain information about the quantity of cardamoms available, all minor produce in the Silent Valley reserve will be collected departmentally, and sold.	675 to 677	158
113	*Regeneration of cardamoms.*—Gaps created by fellings in the sholas will be planted with cardamom seedlings at 6′ × 6′, if by the commencement of the second year after felling they have not been naturally invaded, and provided natural seedlings are close at hand. The planting should be done between June and September and the expenditure per gap restricted to a maximum of one anna	678 and 679	158, 159
114	*Lac cultivation.*—The experimental cultivation of lac in the Kottanikunnu (Panakadan Extension II) reserve will be continued until definite results have been established	680	159
115	*Control.*—A Control Book and Record of Works will be maintained for this and the Bamboo Working Circle together	681	159

THE PROTECTION WORKING CIRCLE.

		PARA.	PAGE
116	*Area.*—The area under this working circle is 49,627 acres	682	159
117	*Prescription.*—No work, except the collection of minor forest produce, will be permitted in the area	683	159

MISCELLANEOUS REGULATIONS.

		PARA.	PAGE
118	*Fire protection.*—The existing practice will be continued, except that boundaries passing through sholas on both sides or that are formed by large perennial streams will not be fire traced. Teak plantations will be specially fire protected, and three miles of the north-eastern boundary of Attapadi Block VI, will be newly added to the length of lines for annual clearing and burning. Paths passing through grassland in sholas will be cleared and burnt to a width of 10′ on either side	684 to 690	160
119	*Roads and paths.*—The Sappal-Muthikulam, the Sappal-Elival and the Walakad-Poonmalai paths will be widened to a minimum width of four feet. The Aruvamparai-Chindaki, Muthikulam-Velligiri-Pothuparapallam, and Anamulli-Chindaki paths will be reconstructed in parts.		
	The following roads and paths will be newly constructed in the order given: Pulikal-Singapara footpath, Kumaramputhur-Adivaram gravelled road, Palamalai-Kalladikode path, Pothuparapallam-Varadimalai path, and Varadimudi serambi path	691 to 693	160, 161
120	*Camps and Rest-houses.*—The undermentioned programme of construction is prescribed in the order given: Serambi and outhouses at Singapara, serambi and outhouses at Kanavarai (Varadimudi) in Bolampatty Block II, reconstruction of the Nilikal upper serambi, a new serambi at Aruvampara, and a serambi and outhouses at Pothuparapallam	694	161
121	*Kolmarams.*—Kolmarams and chattams of *Palaquium ellipticum* and *Calophyllum elatum* may be extracted from all coupes from which they may be profitably worked, as soon as the market improves	695	162
122	*Mesua plough shafts.*—The demand for *Mesua* plough shafts in certain taluks of the Coimbatore district should be met by the sale of top ends and rejections from the nearer coupes of the Attapadi felling series of the Selection Working Circle	696	162
123	*Sleepers of inferior species.*—The possibility of selling railway sleepers of *Palaquium* and *Calophyllum* to the railways in dry tracts should be investigated	697	162
124	*Seasoning of sleepers and kolmarams.*—The advantages of air-seasoning sleepers of *Mesua* and kolmarams of *Palaquium, Calophyllum, Vateria* and *Poeciloneuron,* in the shade of the sholas, should be studied	698 and 699	163
125	*Matches.*—The possibility of stimulating a trade in *Vateria* wood for match-making might be investigated	700	163
126	*Floating.*—The possibility of floating sleepers and kolmarams from Attapadi Block VI down the Kanhira puzha to Ponnani should be studied	701	163
127	*Rosewood* (Dalbergia latifolia).—Attempts should be made to extract in logs the large-sized rosewood from the Attapadi valley, failing which they may be sawn into sleepers	702	163
128	*Minor produce.*—The economic possibilities of the oil from the seeds of *Palaquium ellipticum* for soap-making should be ascertained	703	163
129	*Boundaries.*—Boundaries not prescribed to be firetraced annually will be cut and burnt once in three years	704 to 706	163, 164
130	*Area discrepancies.*—The differences observed in the areas of reserves between the figures given under their respective notifications under section 16 and those furnished in the Survey of India maps should be reconciled	707 and 708	164

	PARA.	PAGE
131 *Research and statistics.*—The tree increment plots laid out for *Mesua* and *Palaquium* will be measured by the Provincial Silviculturist every third year. Experiments to ascertain the conditions for the establishment and development of the natural regeneration of *Palaquium* and *Mesua* will be undertaken by the Provincial Silviculturist	709 to 711	164
132 *Fire protection of grassland in sholas.*—An experiment has been prescribed to determine the best manner of raising a fire resistant fringe of vegetation on the edges of grassland in sholas ..	712	164
133 *Volume tables.*—Statistics will be collected for the preparation and extension of the volume tables for *Mesua ferrea* and *Palaquium ellipticum*	713	165
134 *Dalbergia sissu.*—An experiment has been prescribed to test the possibility of growing *Dalbergia sissu* on certain islands in the Bhavani river	714	165
135 *Stores, tools and plant.*—Provision has been made for the purchase of and repairs to stores and tools, at an annual rate of Rs. 400 ..	717	166
136 *Timber Transit Rules.*—Temporary tannahs may be established as necessary, with the Collector's sanction	718	166
137 *Reallocation of ranges.*—The reallocation of Palghat and Bolampatty ranges so as to include Attapadi Block VI in the former and portion of the Walayar forests in the latter has been suggested	719 to 726	166, 167
138 *Malarial prophylaxis.*—Prophylactic measures have been prescribed	727 and 728	167
139 *Control.*—Instructions have been given for the maintenance of the Control Book, Record of Works, Annual Summary of Revenue and Expenditure, Nursery and Regeneration Ledgers, Gap register, Compartment History, Control Journal and Extraction, Regeneration and Control maps	728 to 738	167, 168
140 *Preservation of special trees and forest types.*—Two trees of *Dalbergia latifolia* and two typical areas of rain forest have been prescribed for permanent preservation	739 to 754	168 to 170
141 *Establishment.*—No increase is proposed. Some temporary hands are recommended for permanency	755 and 756	170
142 *Labour.*—Increase in the areas set apart for kumri by hill tribes in Attapadi Blocks I to VI, is proposed. Grazing by hill tribes should be controlled by issue of free permits	757 and 758	170, 171
143 *Financial Forecast.*—The anticipated gross revenue in the next ten years is Rs. 15,99,320 and the expenditure, Rs. 14,98,960. The net annual revenue anticipated is therefore Rs. 10,036. The expenditure is 93·7 per cent of the gross revenue. The net revenue is a little over one anna and nine pies per acre per annum	764 to 770	171 to 173
144 The plan has cost Rs. 77,481–0–3.		

APPENDICES.

The following are the appendices to this plan :—

1	Appendix I	Rights and concessions in all the reserves covered by this plan.
2	Appendix II (*a*) to (*l*).	Control forms.
3	Appendix III (*a*) and (*b*)	Botanical index of trees and shrubs commonly met with inside the working plan area, and the corresponding vernacular (Malayalam) index.
4	Appendix IV	Field Book of the position of sample trees of *Mesua ferrea* and *Palaquium ellipticum* in the girth increment plots.
5	Appendix V (*a*) to (*c*).	Compartment histories.
6	Appendix VI	Maps—These include the Management map, 1″ = 1 mile ; the Plantation map, 8″ = 1 mile ; map of the Fuel Working Circle, 8″ = 1 mile ; Girth increment plot map, 2″ = 1 mile ; and the Stock map, 2″ = 1 mile.

Note.—Appendix IV will not be printed.

Appendices V (*a*), (*b*) and (*c*) will be supplied printed to the District Forest Officer, the Conservator of Forests of the Circle, the Conservator of Forests, III Circle, and the Range officers. Only five copies will be printed.

In Appendix VI—Maps—only the Management map (in two sheets) will be printed.

APPENDIX I.

Rights and Concessions.

1. *Chenat Nair Reserve.*

Serial number and original claimant.	Description of right.	Present holder.	Remarks.
A.—Rights to water.			
1 Mundur Kizhake Variath Ramunni Warriar.	Right to take water by means of a channel from an anicut constructed within the reserve boundary, with the right to repair the same, provided no trees are cut or injured without the previous permission of the proper forest authorities.	Sankara Warriar.	This right is marked No. 1 on the 8-inch trace. It is known as the Edupeda channel branching from Odamalai puzha. It is 5 feet wide with a bearing of 284 degrees 30 feet in the direction of its flow and the length within the reserve is 616 links. It quits the reserve at 133 links east of station No. 449.
2 Kunnath Rama Menon.	Right to an anicut, water channel and tank, constructed within the reserved forest ; with liberty to improve and repair the same, provided that he cuts or injures no tree without the previous permission of the proper forest authorities. He may, without such permission and of right, cut away grass and small shrubs of no value that overhang or otherwise interfere with the safety or usefulness of the above works.	Subrahmani Ayyar.	This right is marked No. 2 on the 8-inch trace. The channel which is known as Kovilam patta channel is 4 feet wide and 950 links in length within the reserve. It starts from a stream west of the Dhoni puzha with a bearing of 280 degrees and flows in a general south-west direction quitting the reserve at station No. 320.
3 Ezhuvan Murughan, son of Karuppan.	Right to a dam and water channel situated within the reserve and to repair the same provided that he cuts no tree or valuable shrub without the previous permisson of the proper forest authorities.	Vadakkakara Velayudhan.	The right is marked No. 3 on the trace. The channel branches from a tributary of Puliampalli puzha and quits the reserve 110 links west of station 461. The length of the channel inside the reserve is 169 links. It is feet 5 wide and the dearing is 259 degrees.

Serial number and original claimant.	Description of right.	Present holder.	Remarks.
4 Malan, son of Anaparai Pazhaniandi.	To take water from a dam and channel constructed within the reserved forest and to improve and repair the same provided he cuts or injures no tree or valuable shrub within the forest limits, without first obtaining the consent of the forest authorities to his doing so.	Malan	This channel irrigates field No. 257 of Noochipulli desam, and is marked No. 4 on the trace. Its length is 150 links and it is 4 feet wide. It quits the reserve at station No. 331.
5 Pottekat Sankunni Nayar and his brother Achuthan Nayar.	Right to an anicut and water channel situated within the reserve subject to the condition that the right will be liable to cancelment by the forest authorities if abused or exceeded.	Olappam Mana.	This channel which is 1,513 links in length within the reserve and of an average width of 8 feet irrigates field No. 62 of Noochipulli desam. The bearing at the starting point is 225 degrees and it quits the reserve 200 links west of station No. 478. It is marked No. 5 on the 8-inch trace.
6 Kormayil Koppan Nayar.	Right to a dam and channel constructed within the reserve and to improve and repair the same and to clear the banks of the channel and dam of any vegetation that may impair their usefulness subject to the same restrictions as Nos. 1 to 4.	Narayanan Nambudiri of Puvulli Mana.	The channel runs from the Korma todu with a bearing of 107 degrees. The length within the reserve is 80 links. The width of channel is 5 feet. It quits the reserve at 100 links south of station No. 341. It is marked as No. 6 on the 8-inch trace.
7 Madathil Veetil Chathu Menon.	Right to the use of water which has hitherto supplied his anicut subject to the condition that the stream is not diverted or the free flow of water interfered with. His claims are admitted to that extent and no more.	Madathil Veetil Sankara Menon.	The right is marked No. 7 on the 8-inch trace. It starts from a branch of the Vellaitampatti puzha and quits the reserve at station No. 263. The length of the channel is 176 links. It is 4 feet wide.

B. Public rights of way.

1	A public right of way from Dhoni through dip betwixt the Thekedam and Kanarkunnu hills down to Myladipara.	....	This path which is 2 miles in length and 10 yards wide, after entering the reserve at station No. 312, runs in a generally easterly direction and finally quits the reserve at station No. 258. It is open to men and animals and is marked (P.R.W. 1) on the 8-inch trace.
2	A public right of way running north and south betwixt Odimalai and Kallarmala.	....	This path, which is open to men and animals, is 1,125 yards in length and 10 yards wide. It enters the reserve at station No. 357 and running in a northerly direction finally quits the reserve at station No. 438. It is marked (P.R.W. 2) on the 8-inche trace.
3	A public right of way running south to north through the gap in Adi or Yadimalai.	....	This path which is commonly called 'Jeddamalai vazhi' is 337 yards in length and 10 yards wide. It enters the reserve just on the east side of station No. 402 and running in a northerly direction finally quits the reserve at 100 links west of station No. 420. It is open to men and animals and is marked (P.R.W. 3) on the 8-inch trace. It was not admitted at the original settlement. It is admitted now under section 18 of the Madras Forest Act, 1882.

C. Private rights of way.

Serial number and original claimant.	Description of right.	Present holder.	Remarks.
4	All persons who hold rights to water from dams and water channels have also the right of way to such dams and channels.	....	To a width of 12 feet.
5	The lands held by Thenkurishi Rama Menon at the time of settlement being surrounded by forest the occupant is entitled to the cart road leading from the boundary to Myladipara and thence to Palghat in so far as it lies within the forest limits and to the use of a foot-path running almost due south from these lands.	....	This cart road which is 660 yards in length and 10 yards wide enters the reserve at station No. 246 and running along the boundary in a north-westerly direction ends with station No. 258. It is marked No. 5 in the 8-inch trace.
6	The Palghat Raja and those holding rights under him have the right to pass with or without carts along the south-eastern borders of the forest for a short distance from Myladipara to the Raja's Emur devaswam forests.	....	This path which is 835 yards in length and 10 yards wide first enters the reserve at station No. 227 and running north and then eastwards for a distance of 385 yards quits the reserve at station No. 216 and then re-enters the reserve 250 links north-east of station No. 191 and thence running in a north-easterly direction for a distance of 450 yards finally quits the reserve at station No. 186. It is marked (R.W. 6) in the 8-inch trace.
7	Mukunni Kuruppu and those holding rights under him have a right of way to pass along a small part of north-western borders of the forests along the Meenpuzha river in order to proceed from Tuppanad to Mukunni Kuruppu's forests north of the stream.	....	This path is 167 yards in length and 10 yards wide. It is open to men and animals and for dragging timber. It is marked as R.W. 7 in the 8-inch trace.

2. *Thampurattipottai and Addition.*

The following public right of way will be admitted within the reserve :—

(1) A footpath in S. No. 43/4 of Kottekkod desam, 6 yards wide, open to men and cattle and carts. It enters the reserve at about 5 chains to the south-west of survey No. 43 and leaves the reserved forest at about 4 chains to the north of S. No. 43 and runs northwards to the hills. (*N.B.*—This right is in the Thampurattipottai addition.)

(2) In Chief Conservator's Proceedings No. 509, Mis., dated 30th November 1931, a right of way 30 feet wide and passing through the Thampurattipottai reserved forest has been approved under section 18 of the Madras Forest Act (V of 1882). The right of way is along the existing cart-track from Palghat to Kadukankunnu hills and it is open to men, cattle and vehicles.

3. *Panakadan Reserved Forest and its additions.*

The following public right of way will be admitted through the reserve, path 10 yards wide, open to men and cattle :—

1. Starting from the north-west corner of the addition (No. 1) the path runs along its northern boundary to its north-east corner ; thence the path runs south-west through the addition for about 5 chains till it meets the rock on the eastern boundary of the addition ; thence it runs along the said eastern boundary crossing a thodu to the southern corner of the addition.

The following public rights of way will be admitted through the reserve (viz., Kottanikunnu Reserve—Panakadan Addition No. II). They are open to the public and cattle under control.

2. A path of a uniform width of 10 yards beginning at the trijunction stone of S. Nos. 147, 150 and 167 and running round the edge of the reserve back to this trijunction stone.

3. A path of a uniform width of 10 yards from the northern tip of S. No. 166 to a rough water channel which begins some five chains north of the tip and thence along the line of this channel to the southern extremity of S. No. 168.

4. The existing water channel running from the reserve to the adjoining lands and the channels which feed it will not be disturbed.

4. *Bolampatty Block II.*

Claims to right of way.

Serial number and original claimant.	Description of right.	Present holder.	Remarks.
1 Kondakala Kavandan and others of Mathuvarayapuram village.	Public right of way to the temple on the summit of Vellimalai is admitted subject to certain restrictions. The right is restricted to caste persons: the time of useage is restricted to the months of March and April each year; the number should be limited to 700 as far as practicable; the path to be used is that which passes the hamlet called Poondi, north of the Noyal river. No cooking of any provisions between the reserve boundary and the top of the hill is permitted. No fire is to be kindled within that space.	....	For list of all rights admitted in Bolampatti Block II, vide Working Plan for the Bolampatti valley forests. Only rights over the Shola portion of the reserve included in this plan have been noted here.
2 Lieut.-Col. S. P. Scott, residing at Varadimalai estate.	Right of way is given to Colonel Scott and his servants to go and come through the reserve by the path now used for that purpose and cleared by him with the permission of the Local Fund Board. The path enters the reserve from the fields of Narsipuram about 1½ miles north-west of where that name is shown on the taluk map and runs up to the crest of the hill over Varadimalai.	....	....

APPENDIX II (*a*).

CONTROL BOOK.

Selection Working Circle.

(Silent Valley Felling Series).

Prescriptions of the Working Plan.									Operations actually carried out.											
	Locality to be exploited.				Details of anticipated yield.					Locality exploited.				Details of yield.			Sawn outturn.			
Year	Reserve.	Coupe.	Area in acres.	Nature of felling.	Species.	Number of trees to be felled.	Yield of logs in c.ft.	Net yield in c.ft. and units.	Year.	Reserve.	Coupe.	Area in acres.	Nature of felling.	Species.	Number of trees felled.	Yield of logs c.ft.	Kind.	Number.	Volume in c.ft.	Yield per cent.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
1934-35 ..	Silent valley.	VII	1920	Selection felling.	*Mesua ferrea.*	310	33,000	15,000 cubic feet. 5,000 broad gauge sleepers.	1934–35	Silent valley.	VII	1920	Selection felling.	*Mesua ferrea.*	300	34,000	Broad-gauge sleepers.	4,000	12,000	..
																	Metre gauge sleepers.	2,400	3,600	**48**
														Calophyllum elatum.	40	5,000	Kolmarams.	1,000	**2,500**	**50**

APPENDIX II (*b*) (common to all working circles).

RECORD OF WORKS.

The Selection Working Circle.

(Silent Valley Felling Series.)

Range.

	Prescriptions of the working plan.				Operations actually carried out.					
	Locality to be exploited.				Locality exploited.					
Year.	Reserve.	Coupe.	Area in acres.	Nature of work.	Year.	Reserve.	Coupe.	Area in acres.	Nature of work.	Cost.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
										RS. A. P.
				A. Measure prescribed.						
1934 ..	Attapadi Block I.	VIII	1212	Regeneration of gaps.	1934	Attapadi Block I.	VIII	1212	Regeneration of gaps.	432 1 0
1934 ..	Silent Valley ..	VII	1000	Tending ..	1934	Silent Valley ..	VII	1000	Tending ..	53 12 0

B. Measures suggested.

Nil.

C. Measures neither prescribed nor suggested but carried out.

Nil.

APPENDIX II (*c*).

ANNUAL SUMMARY OF REVENUE.

The Selection Working Circle (common to all working circles).

Year.	Sleepers.	Kolmarams and chattams.	Other timber.	Fuel.	Bamboos.	Minor produce.	Miscellaneous.	Total revenue.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	RS. A. P.	RS. A. P.	RS. A. P.				RS. A. P.	RS. A. P.	
1935-36 ..	1,00,000 0 0	2,000 0 0	200 0 0	..	..	..	*500 0 0	..	*Compounding fees.

APPENDIX II (*d*):

ANNUAL SUMMARY OF EXPENDITURE.

The Selection Working Circle (common to all working circles).

	Conservancy.		Exploitation.		Works.				Establishment.		
Year.	Regeneration, tending and maintenance.	Fire protection.	Timber.	Minor produce.	Roads, etc.	Buildings.	Other works.	Miscellaneous.	Pay and allowances.	Contingencies.	Tota expenditure.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1935—36 ..	5,000 0 0	2,000 0 0	30,000 0 0	500 0 0	2,000 0 0	3,000 0 0	1,000 0 0	300 0 0*	..	..	..

* Freight on Pœciloneuron timber sent to Dehra Dun for experiment.

APPENDIX II (*e*).

REGENERATION LEDGER.

Selection Working Circle, Attapadi Felling Series.

Number of coupe and year of regeneration.—IV. 1933–34.
Area of the coupe.—2,001 acres. (Map 8 inches = 1 mile attached).
Total number of gaps in the coupe.—1,200.
Total number of gaps regenerated.—750.
Date of aligning, staking and soil preparation.—3rd to 25th April 1933.

Espacement.—6′ × 6′.
Total number of patches regenerated.—6,000.
Average number of patches per gap.—8.
Species introduced.—*Acrocarpus*, *Gluta*, ***Dysoxylum*** and ***Artocarpus*.**
Rate of daily wages.—7 annas per man.
Subordinates in charge.—Forester Raman Nayar and Forest Guard Govindan.
Other details.—

Year and month. (1)	Cost. Staking and soil preparation. (2)	Collection of seed. (3)	Dibbling. (4)	Planting. (5)	Nurseries. (6)	Replacement of casualties. (7)	Weeding and mulching. (8)	Soil working. (9)	Monthly rainfall in inches. (10)
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.		
1933–34.									
April	100 0 0	12 3 0	..	..	..	..	..	..	2·3″
May	..	5 0 0	40 0 0	..	..	..	..	..	13·2″
June	..	..	..	25 0 0	20 0 0	..	..	..	50·7″
July	..	..	..	50 0 0	..	..	..	..	75·5″
August	..	..	..	..	..	15 0 0	10 0 0	..	70·2″
September	..	..	..	..	..	20 0 0	40 0 0	..	20·0″
October	..	..	..	..	..	..	..	..	20·0″
November	..	..	..	..	..	..	..	..	10·25″
December	..	..	..	..	..	..	..	..	5·0″
January	..	..	..	..	..	..	..	..	2·2″
February	..	..	..	..	..	..	..	..	3·5″
March	..	..	..	..	..	..	..	..	1·0″
Total ..	**100 0 0**	**17 3 0**	**40 0 0**	**75 0 0**	**20 0 0**	**35 0 0**	**50 0 0**	..	**274·1″**

Total cost of regeneration of the coupe.—Rs. 337-3-0. Average cost per gap.—8 annas. Number of gaps successfully stocked.—675.

GAP LIST.

(DETAILS OF EACH GAP SEPARATELY.)

Number of gap.	Size of gap.	Established natural regeneration in the gap.		Species artificially introduced.	Number of patches in gap.	Percentage of survivals after	
		Mesua.	*Palaquium.*			First hot weather.	Second hot weather.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	30′ × 25′ ..	Nil.	10	Nil	Not regenerated.		
2	66′ × 50′ ..	1	5	*Acrocarpus fraxinifolius* .. .. *Dusoxylum*	10 5	75 90	70 80
3	70′ × 45′ ..	2	3	*Acrocarpus* .. .. .. *Gluta*	10 5	90 100	80 90
4	50′ × 20′ ..	5	12	Not regenerated.			
5	Etc.						
6	Etc.						

Note.—The ledger is to be maintained for each year's coupe separately and closed when the regeneration is finally established.

APPENDIX II (*f*).

CONTROL BOOK.

The Teak Conversion Working Circle.

(Elival Felling Series).

Range.

Prescriptions of the working plan.					Operations actually carried out.							
Year.	Locality to be exploited.			Nature of felling.	Year.	Locality exploited.			Nature of felling.	Details of yield.		Remarks.
	Reserve.	Coupe.	Area in acres.			Reserve.	Coupe.	Area in acres.		Number of logs.	C.FT.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(21)	(13)
1933–34	Chenat Nair.	VI	29	Clearfelling.	1933—34	Chenat Nair.	VI	29	Clearfelling	50 *Xylia* logs. Fuel stacked	750 10,000	Leased to a contractor

APPENDIX II (*g*)*

NURSERY LEDGER.

New or old nursery :
Total number of beds :
Size of beds :

Name of nursery :
Date of sowing :
Date of removal from nursery :

Number of seedlings or stumps removed for planting out :
Cost or production of 100 stumps.

Year and month.	Seed collection.		Transport of seed.		Reforming old beds.		Manuring old beds.		Formation of new beds.		Sowing or dibbling.		Watering.		Preparation of stumps.	Miscellaneous (Specify).	Rainfall in inches.	Remarks.
	Quantity sown.	Cost.	Quantity.	Cost.	Number.	Cost.	Number.	Cost.	Number.	Cost.	Number of beds.	Cost.	Number of days.	Cost	Cost.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Total ..																		

* Common to Selection and Teak Conversion Working Circles.

APPENDIX II (*h*).

REGENERATION LEDGER.

The Teak Conversion Working Circle.

(Elival Series.)

1 Regeneration area Coupe No. ;
Reserve : Range ;
Palghat Division: Area Acres.
2 Date of timber felling.
3 Date of clear-felling.
4 Date of first burning.
5 Date of final burning.
6 Date of sowing, planting, or dibbling.
7 Espacement ; and for sowing or dibbling, number of seeds per pit.
8 Dimensions of pits.
9 Total number of stakes in the coupe
10 Date when the kumridars left the coupe.
11 Names of kumridars.
12 Rate of daily wages.
13 Subordinates in charge.
14 Percentage of survival at the beginning of the second growing season.
15 Percentage of survival at the beginning of the third growing season.
16 Species introduced.
17 Other details.

Year and month.	Felling useless species.	Burning.	Aligning and staking.	Soil preparation.	Seed or nursery costs.	Original dibbling.	Original planting.	Replacing casualties.	Weeding.	Scraping.	Soil working.	Fire protection.	Other expenses.	Monthly totals.	Monthly rainfall.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Totals ..																
Average per acre ..																

APPENDIX II (*j*) (Common to Selection, Teak Conversion and Tending Working Circles).

COMPARTMENT HISTORY.

Elival Felling Series.

‘ Compartment No.

Elival 1929.

Total area in acres.	Aspect, slope and soil.	Year of formation.	Description of overwood.	Undergrowth and underwood.
32·5	Aspect : South and east .. .. .. Slope. Gentle to steep. Soil : Clayey loam—inclined to be swampy near stream	1929	Pure teak over most of the area. *Teriminalia tomentosa* in swampy bits.	Undergrowth—Scattered, species of Cosmos. Underwood.—Nil.

Year.	Details of History.
1929	Logged natural forest clear-felled, burnt and planted with teak stumps 6′ × 6′ and weeded.
1930	Weeded—Casualities replaced—Swampy areas notched with germinating seeds of *Terminalia tomentosa*.
1931	Weeded.

APPENDIX II (*k*).

CONTROL BOOK.

The Fuel Working Circle.

	Prescriptions of the working Plan.				Operations actually carried out.						
	Locality to be exploited.					Locality exploited.					
Year.	Reserve.	Coupe.	Area in acres.	Nature of felling.	Year.	Reserve.	Coupe.	Area in acres.	Nature of felling.	Details of yield.	Revenue realized.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1933	Thampuratti pottai Reserve.	I	14·25	Simple coppice.	1933	Thampuratti pottai.	I	14·25	Simple coppice.	Contractor's figure— C.FT. Teak .. 200 Vengai .. 120 Fuel— Billets .. 10,000 Faggots .. 200 head loads.	Rs. 40 per acre Rs. 570.

APPENDIX II (*l*).

CONTROL BOOK.

The Bamboo and Minor Produce Working Circles.

Prescriptions of the Working plan.		Results of operations.				
		Produce leased.		Produce collected departmentally.		
Year.	Operations prescribed.	Kind and quantity collected.	Revenue realized.	Kind and quantity.	Cost of collection.	Revenue realized.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			RS. A. P.		RS.	RS.
1932–33 ..	1 Lease of minor produce in Chenat Nair, etc., reserves.	Honey 10 tins .. .. Pepper 10 maunds .. .. Sheekoi 200 maunds	750 0 0			
	2 Collection of minor produce in Silent Valley.	....	..	Cardamoms 500 maunds. Honey 5 tins ..	250 5	1,000 50
	3 Lease of minor produce in Attapadi Blocks I to V.	Sheekoi 500 maunds. Honey 50 tins. Cardamoms 50 maunds.	..			
	4 Lease of Bamboo Coupe II ..	Bamboos 50,000 .. .. Splits 500 carts	1,200 0 0			
	5 Sale of head load tickets for reeds in Chenat Nair.	8,000 head loads	500 0 0			
	9 Sale of head-load tickets for fodder grass in Chenat Nair.	1,000 head-loads	15 10 0			

APPENDIX III-A.

List of trees and shrubs commonly found in Palghat division.

Botanical name.	Malayalam name.
Abrus precatorius	Kunni.
Acacia concinna	Cheenikka.
Acacia intsia	Inja.
Acrocarpus fraxinifolius	Malaveppu.
Acronychia laurifolia	Moottanari.
Actinodaphne hookeri	Iyoli.
Adenochlœna indica.	
Adina cordifolia	Manjakadamba.
Aegle marmelos	Koovalam.
Ageratum conyzoides	Appa.
Aglaia sp.	Karagil.
Agrostistachys indica.	
Agrostistachys longifolia.	
Ailanthus malabarica	Mattipal.
Alangium lamarckii	Ankolam.
Albizzia lebbek	Vaka.
Albizzia odoratissima	Karuvaka.
Albizzia procera	Vellavaka.
Albizzia stipulata	Pottuvaka.
Allophylus cobbe.	
Alseodaphne semecarpifolia.	
Alstonia scholaris	Pala.
Alternanthera echinata	Kakkimullu.
Amoora canarana	Karagil.
Ancistrocladus heyneanus.	
Anogeissus latifolia	Vellanava.
Anthocephalus cadamba	Kadambam.
Antiaris toxicaria	Maraviri.
Antidesma diandrum	Asaripuli.
Apama siliquosa (*Bragantia wallichii*).	Alpam.
Aporosa lindleyana.	
Ardisia humilis.	
Arenga wightii	Kattuthengu.
Artocarpus hirsuta	Aini.
Artocarpus integrifolia	Pilavu.
Artocarpus lakoocha.	
Asparagus racemosus	Sathavalli.
Baccaurea courtallensis	Nannil.
Bambusa arundinacea	Mula.
Barringtonia acutangula.	
Bassia malabarica.	
Bassia latifolia	Iluppa.
Bauhinia malabarica	Mantharam.
Bauhinia purpurea.	
Bauhinia vahlii.	
Begonia sp.	
Bischofia javanica	Cholavenga.
Blainvillea rhomboidea.	
Boehmeria malabarica.	
Bombax malabaricum	Poola.
Bragantia wallichii (*Apama siliquosa*).	Alpam.
Breynia angustifolia	Kattu niruri.
Bridelia retusa.	
Buddleia asiatica.	
Butea frondosa	Plas.
Butea superba.	
Cœsalpinia bonducella	Kazhanji.
Cœsalpinia mimosoides	Timullu.
Calamus sp.	Chooral.
Callicarpa lanata.	
Calophyllum elatum.	Chempakam.
Calophyllum tomentosum	Do.
Calotropis gigantea	Erukku.
Calotropis procera	Do.
Canarium strictum	Kunthirikkam (Pantham).
Canthium didymum	Nannul.
Capparis horrida.	
Capparis moonii.	
Carallia integerrima.	
Careya arborea	Pezha.
Carissa carrandas	Klavu.
Cassia auriculata	Avaram.
Cassia fistula	Kanikonna.
Cassia occidentalis.	
Cassia tora	Takara.
Cedrela toona	Chukannagil.
Celtis wightii.	
Chrysophyllum roxburghii.	
Chukrassia tabularis	Chukannagil.

Botanical name.	Malayalam name.
Cinnamomum zoylanicum	Lavangam.
Cinnamomum sulphuratum.	
Cipadessa fruticosa.	
Cissampelos pareira.	
Clausena willdenowii.	
Cleistanthus malabaricus	Odugu.
Clematis sp.	
Clerodendron infortunatum	Peruku.
Cochlospermum gossypium	Seemapanji.
Colebrookia oppositifolia.	
Combretum decandrum.	
Cordia myxa	Viri.
Cratœva religiosa.	
Croton malabaricus.	
Croton scabiosus.	
Cullenia excelsa	Chakka mullan.
Curcuma sp.	Koova.
Cycas circinalis	Inta.
Cyclostemon confertiflorus.	
Dalbergia latifolia	Veetti.
Dalbergia paniculata.	
Dalbergia lanceolaria	Vella-Veetti.
Dalbergia sissoides	Veetti.
Debregesia velutina.	
Dendrocalamus strictus	Mula.
Derris sp.	
Desmodium sp.	
Dichopsis elliptica (*Palaquium ellipticum*).	Pali.
Dillenia pentagyna	Vazhapunna
Diospyros assimilis.	
Diospyros microphylla.	
Dodonaea viscosa	Virali.
Dysoxylum malabaricum	Vellagil.
Elaeagnus latifolia.	
Elaeocarpus oblongus	Rudraksham.
,, *serratus*	Do.
,, *munroii*	Do.
,, *tuberculatus*	Do.
Elaeodendron glaucum	Karuniraka.
Elettaria cardamomum	Elam.
Entada scandens	Kakkavalli.
Eriodendron anfractuosum	Seemapoola.
Eriolœna quinquilocularis.	
Erythrina indica	Murukku.
Erythrina lithosperma.	
Eugenia gardneri	Naval.
Eugenia jambolana	Do.
Eugenia lœta.	
Eugenia munroii.	
Euonymus angulatus.	
Euonymus indicus.	
Eupatorium glandulosum.	
Eurya japonica.	
Evodia roxburghiana.	
Fagrœa obovata.	
Ficus bengalensis.	Aal.
,, *callosa.*	
,, *glomerata.*	
,, *hispida.*	
,, *religiosa*	Arasu.
,, *rumphii.*	
Filicium decipiens	Niroli.
Flacourtia sepiaria.	
Flemingia strobilifera.	
Fluggea microcarpa	Perinklavu.
Garcinia malabarica	Kodampuli.
Garcinia spicata.	
Garcinia xanthochymus.	
Garuga pinnata.	
Gaultheria fragrantissima.	
Glochidion malabaricum.	
Glycosmis pentaphylla	Penal.
Gmelina arborea	Kumilu.
Gnetum scandens.	
Gomphandra polymorpha.	
Gordonia obtusa	Ola.
Grewia asiatica.	
Grewia lœvigata.	
Grewia tiliœfolia	**Chadachi.**
Harpulia cœpanioides	

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Botanical name.	Malayalam name.
Helicteres isora	Valampiri.
Hemicyclea elata	Konamaram.
Hemigyrosa canescens.	
Heptapleurum racemosum.	
Heritiera papilio.	
Heynea trijuga	Karukkati.
Hiptage madablota.	
Holarrhena antidysenterica	Vempala.
Holigarna arnottiana	Naicheru.
Holigarna grahamii.	
Holoptelia integrifolia	Aval.
Homalium zeylanicum.	
Hopea parviflora	Irumbagam.
Hopea wightiana	Do.
Hopea glabra	Do.
Hydnocarpus wightiana	Maravatti.
Hydnocarpus alpina	Do.
Hymenodictyon excelsum	Vellakadamba.
Hypericum mysorense.	
Ichnocarpus frutescens.	
Indigofera pulchella.	
Ipomœa sp.	
Ixora coccinea	Tecci.
Impatiens sp.	
Jasminum humile	Kattumulla.
Jatropha curcas	Kattamanakku.
Jatropha gossypifolia	Seema avenakku.
Justicia sp.	
Kydia calycina	Velukku.
Lagerstrœmia lanceolata	Ventek.
Lansium anamalayanum.	
Lantana indica	Arippu.
Laportia crenulata	Anachoriyan.
Lasiosiphon eriocephalus.	
Lawsonia alba	Mylanji.
Leea sambucina.	
Leea aspera.	
Lepisanthes deficiens.	
Leucœna glauca.	
Limonia acidissima.	
Linociera malabarica.	
Litsœa stocksii.	
Litsœa wightiana.	
Loranthua sp.	Ithikkanni.
Luvunga eleutherandra.	
Macaranga raxburghii	Podikonni.
Macaranga indica.	
Machilus macrantha	Kolamavu.
Maesa perrottetiana.	
Maesa indica.	
Mallotus philippinensis	Kapila.
Mangifera indica	Mavu.
Mappia foetida	Peenari.
Mastixia arborea	Mattipal.
Melastoma malabathricum.	
Melia dubia	Malavembu.
Melia indica	Veppu.
Meliosma arnottiana	Kallavi.
Memecylon edule	Kasavu.
Mesua ferrea	Churuli.
Miliusa indica.	
Mimosa pudica	Thottavadi.
Mimusops elengi	Elengi.
Morinda tinctoria.	
Morinda umbellata.	
Moringa pterygosperma	Muringa.
Mucuna pruriens	Naikorana.
Murraya exotica.	
Mussœnda frondosa	Vellithali.
Myristica attenuata	Chora pali.
Myristica laurifolia	Do.
Myristica malabarica	Do.
Nauclea purpurea.	
Nephelium longana	Cholapoovam.
Ochlandra beddomei	Oda
Ochlandra rheedii	Do.
Odina wodier	Annakkara.
Olea dioica	Itala.
Orophea uniflora.	
Oroxylum indicum	Vellapathiri.
Ostodes zeylanica.	
Pajanelia rheedi.	
Palaquium ellipticum (*Dichopsis elliptica*).	Pali.
Pandanus furcatus	Thazha.
Paramignya armata.	
Pavetta indica	Pavatta.

Botanical name.	Malayalam name.
Phœnix humilis	Inta.
Phyllanthus emblica	Nelli.
Pinanga dicksonii	Kattu kavungu.
Piper nigrum	Kurumulagu.
Piper subpeltatum.	
Pithecolobium bigeminum.	
Plumeria acutifolia	Arali.
Pœciloneuron indicum	Vayal.
Palyalthea fragrans	Nedunar.
Polyalthea coffeoides	Do.
Pongamia glabra	Ungu.
Premna tomentosa	Naithekku, Kattuthekku.
Pterocarpus marsupium	Venga.
Pterospermum acerifolium.	
Pterospermum rubiginosum.	
Putranjiva roxburghii.	
Pygeum wightianum.	
Randia dumetorum	Kara.
Rhododendron arboreum.	
Rubus moluccanus	
Rubus lasciocarpus.	
Saccopetalum tomentosum.	
Salix tetrasperma.	
Samadera indica	Karingota.
Sapindus laurifolius	Urewanji.
Sapium insigne.	
Saprosma fragrans.	
Sarcococca pruniformis.	
Sarcostigma kleinii.	
Sauropus albicans.	
Schleichera trijuga	Poovam.
Scolopia crenata	Cheralu.
Semecarpus anacardium	Cheru.
Senecio araneosus.	
Smilax macrophylla.	
Solanum gigantium	Chunda.
Solenocorpus indica.	
Spatholobus sp.	
Spondias mangifera	Ampazham.
Stephegyne parvifolia.	
Sterculia guttata	Thondi.
Sterculia villosa	Vakka.
Stereospermum chelenoides	Padiri
Stereospermum xylocarpum	Vedankorana.
Streblus asper	Kurunji.
Strobilanthes sp.	
Strombosia ceylanica.	
Strychnos nux-vomica	Kanjiram.
Strychnos potatorum	Thethan.
Swietenia macrophylla.	
Symplocos spicata.	
Tabernœmontana heyneana.	
Tamarindus indica	Puli.
Tectona grandis	Thekku.
Tephrosia purpurea.	
Terminalia arjuna.	
Terminalia belerica	Thani.
Terminalia paniculata	Pillamarudu.
Terminalia tomentosa	Karumarudu.
Tetrameles nudiflora	Pontham cheeni.
Thespesia lampas.	
Thraulococcus erectus.	
Thunbergia mysorensis.	
Toddalia asiatica.	
Trema orientalis	Amathali.
Trewia nudiflora.	
Turpinia pomifera.	
Vaccinium nilgherrense.	
Vateria macrocarpa	Vellapayini.
Vateria indica	Do.
Ventilago madraspatana.	
Vernonia arborea.	
Vitex altissima	Miladi.
Vitex negundo	Nochi.
Vitis sp.	
Walsura piscida.	
Webera corymbosa.	
Wendlandia notoniana.	
Woodfordia floribunda.	
Wrightia tinctoria	Pala.
Xanthophyllum flavescons.	
Xylia xylocarpa	Irul.
Zanthoxylum rhetsa	Achumullu.
Zizyphus jujuba	Elantha.
Zizyphus œnoplia	Churi.
Zizyphus xylopyrus	Kottamullu.

APPENDIX III-B.

Malayalam name.	Botanical name.
Aal (Peral)	*Ficus bengalensis.*
Achumullu	*Zanthoxylum rhetsa.*
Aini	*Artocarpus hirsuta.*
Alpam	*Apama siliquosa* (*Bragantia wallichii*).
Amathali	*Trema orientalis.*
Ampazham	*Spondias mangifera.*
Anachoriyan	*Laportea crenulata*
Ankolam	*Alangium lamarckii.*
Annakara	*Odina wodier.*
Appa	*Ageratum conyzoides.*
Arali	*Plumeria acutifolia.*
Arasu (Arayal)	*Ficus religiosa.*
Arippu	*Lantana indica.*
Asaripuli	*Antidesma diandrum.*
Aval	*Holoptelia integrifolia.*
Avaram	*Cassia auriculata.*
Chadachi	*Grewia tiliæfolia.*
Chakkamullan	*Cullenia excelsa.*
Chembagam	*Calophyllum elatum* and *tomentosum.*
Cheenikka	*Acacia concinna.*
Cheru	*Semecarpus anacardium.*
Cheralu	*Scolopia crenata.*
Chola puvam	*Nephelium longana.*
Chola venga	*Bischofia javanica.*
Chooral	*Calamus sp.*
Chora pali	*Myristica laurifolia.*
Chukannagil	*Cedrela toona* and *Chukrassia tabularis.*
Chunda	*Solanum giganteum.*
Churi	*Zizyphus œnoplia.*
Churili	*Mesua ferrea.*
Elam	*Elettaria cardamomum.*
Elenji	*Mimusops elengi.*
Elantha	*Zizyphus jujuba.*
Erukku	*Calotropis gigantea* and *procera.*
Iluppa	*Bassia latifolia.*
Inja	*Acacia intsia.*
Inta	*Cycas circinalis ; Phœnix humilis.*
Irul	*Xylia xylocarpa.*
Irumbagam	*Hopea glabra, parviflora,* and *wightiana.*
Itala	*Olea dioica.*
Ithikkanni	*Loranthus sp.*
Iyoli	*Actinodaphne hookeri.*
Kadambam	*Anthocephalus cadamba.*
Kakhi mullu	*Alternanthera echinata.*
Kakkavalli	*Entada acandens.*
Kallavi	*Meliosma arnottiana.*
Kanikonna	*Cassia fistula.*
Kanjiram	*Strychnos nux-vomica.*
Kapila	*Mallotus philippinensis.*
Kara	*Randia dumetorum.*
Karagil	*Aglaia sp.* and *Amoora canarana.*
Karingota	*Samadera indica.*
Karumarudu	*Terminalia tomentosa.*
Karukatti	*Heynea trijuga.*
Karuneeraka	*Elaeodendron glaucum.*
Karuvaka	*Albizzia odoratissima.*
Kasavoo	*Memecylon edule.*
Kattu kavungu.	*Pinanga dicksonii.*
Kattavanaku	*Jatropha curcas.*
Kattumulla	*Jasminum humile.*
Kattu niruri	*Breynia angustifolia.*
Kattu thengu	*Arenga wightii.*
Kazhangi	*Cæsalpinia bonducella.*
Klavu	*Carissa carrandas.*
Kodampuli	*Garcinia malabarica.*
Konamaram	*Hemicyclea elata.*
Koova	*Curcuma sp.*
Koovalam	*Aegle marmelos.*
Kotta mullu	*Zizyphus xylopyra.*
Kumilu	*Gmelina arborea.*
Kunni	*Abrus precatorius.*
Kunthirakam (Pantham).	*Canarium strictum.*
Kurumolagu	*Piper nigrum.*
Kurunji	*Strobilanthes sp.*
Lavangam	*Cinnamomum zeylanicum.*
Malavembu	*Melia dubia.*
Malaveppu	*Acrocarpus fraxinifolius*
Mandaram	*Bauhinia malabarica.*
Manjakadamba	*Adina cordifolia.*
Maravatti	*Hydnocarpus wightiana* and *alpina.*
Maraviri	*Antiaris toxicaria.*
Mattipal	*Mastixia arborea* and *Ailanthus malabarica.*
Mavu	*Mangifera indica.*
Miladi	*Vitex altissima.*
Moottanari	*Acronychia laurifolia.*
Mula	*Bambusa arundinacea.*
Murukku	*Erythrina indica.*
Muringa	*Moringa pterygosperma.*
Mylanji	*Lawsonia alba.*
Naicheru	*Holigarna arnottiana.*
Naikorana	*Mucuna pruriens.*
Naithekku	*Premna tomentosa.*
Nannul	*Canthium didymum.*
Naval	*Eugenia gardneri* and *jambolana.*
Nedunar	*Polyalthea fragrans* and *coffeoides.*
Niroli	*Filicium decipiens.*
Nochi	*Vitex negundo.*
Oda	*Ochlandra beddomei* and *rheedii.*
Odugu	*Cleistanthus malabaricus.*
Ola	*Gordonia obtusa.*
Padiri	*Stereospermum chelenoides.*
Pala	*Alstonia scholaris.*
Pali	*Dichopsis elliptica* (*Palaquium ellipticum*).
Pamparam	*Croton malabaricus.*
Panal	*Glycosmis pentaphylla.*
Pantham (Kunthirikkam).	*Canarium strictum.*
Pavatta	*Pavetta indica.*
Peenari	*Mappia fœtida.*
Peral	*Ficus bengalensis.*
Perinklavu	*Fluggea microcarpa.*
Peruku	*Clerodendron infortunatum.*
Pozhu	*Careya arborea.*
Pilavoo	*Artocarpus integrifolia.*
Pillamarudu	*Terminalia paniculata.*
Plas	*Butea frondosa.*
Podikanni	*Macaranga roxburghii* and *indica.*
Pontham cheeni.	*Tetrameles nudiflora.*
Poola	*Bombax malabaricum.*
Pottuvaka	*Albizzia stipulata.*
Poovam	*Schleichera trijuga.*
Puli	*Tamarindus indica.*
Rudraksham	*Elaeocarpus oblongus, serratus, munroii, tuberculatus.*
Sathavalli	*Asparagus racemosus.*
Seema avanaku.	*Jatropha gossypifolia.*
Seema panji	*Cochlospermum gossaypium.*
Seema poola	*Eriodendron anfractuosum.*
Seethampoo	*Hiptage madablota.*
Takara	*Cassia tora.*
Tecci	*Ixora coccinca.*
Timullu	*Cæsalpinia mimosoides.*
Thani	*Terminalia belerica.*
Thazha	*Pandanus furcatus.*
Thekku	*Tectona grandis.*
Thethan	*Strychnos potatorum.*
Thondi	*Sterculia guttata.*
Thottavadi	*Mimosa pudica.*
Ungu	*Pongamia glabra.*
Uruwanji	*Sapindus laurifolius.*
Vaka	*Albizzia lebbek.*
Vakka	*Sterculia villosa.*
Valampiri	*Helicteres isora.*
Vayal	*Pœciloneuron indicum.*
Vazha punna	*Dillenia pentagyna.*
Vadan korna	*Stereospermum xylocarpum.*
Veerali	*Dodonæa viscosa.*
Veetti	*Dalbergia latifolia* and *sissoides.*
Vellagil	*Dysoxylum malabaricum.*
Vellakadamba	*Hymenodictyon excelsum.*
Vellanava	*Anogeissus latifolia.*
Vella veeti	*Dalbergia paniculata* and *lanceolaria.*
Vellapadri	*Oroxylum indicum.*
Vellapayini	*Vateria macrocarpa.*
Vellavaka	*Albizzia procera.*
Vellithali	*Mussænda frondosa.*
Velukku	*Kydia calycina.*
Vempala	*Holarrhena antidysenterioca,*
Venga	*Pterocarpus marsupium.*
Ventek	*Lagerstrœmia lanceolata.*
Veppu	*Melia indica.*
Viri	*Cordia myxa.*

Proceedings of the Chief Conservator of Forests

Proceedings No. 42, Press, 24th January 1934

Working plan—Ghat forests of the Palghat division—Sanctioned.

A. Wimbush, Esq., I.F.S.,
Chief Conservator of Forests.

Read—the following paper :—

Letter from the Conservator of Forests, Working Plans Circle,
dated 18th August 1933, No. 857/28.

Proceedings—No. 42, Press, dated 24th January 1934.

Sanctioned

2. Reference to paragraph 764 shows that financial success under this working plan depends upon the production and profitable sale of sleepers. Owing to the recent fall in the price of sleepers since the working plan was written it is not at present a paying proposition to make sleepers in most of the localities covered by the working plan. For the time being, therefore, most of the prescriptions under the Selection Working Circle will have to be held in abeyance and this is approved.

3. The working plan contains numerous highly desirable prescriptions, all of which could be justified had the price of sleepers and kolmarams kept up to its anticipated level and resulted in the production of revenue as forecasted in the working plan. Since, for the time being, there is no expectation of realizing anything approaching the amount of revenue forecasted in the working plan, it will be necessary for the District Forest Officer and Conservator to decide in detail which specific prescriptions must be held in abeyance in whole or in part until times improve. These two officers must review the situation every year at the time of preparing the plan of operations.

4. Proper control of the prescriptions will require especial care. In order to ensure that desirable prescriptions are not held in abeyance longer than the financial situation demands a deviation statement containing a list of prescriptions which it is proposed to hold in abeyance for the ensuing year must be sent to the Chief Conservator for sanction each year as soon as the plan of operation has been drawn up.

A. Wimbush,
Chief Conservator of Forests.

(True copy)

C. Shelswell,
Personal Assistant.

To the Conservator of Forests, Working Plans Circle, Ootacamund }
,, Conservator of Forests, Ootacamund Circle, Ootacamund } in typescript first.
,, District Forest Officer, Palghat }

Copy to the other Conservators and District Forest Officers ; Principal, Madras Forest College, Coimbatore and Provincial Sylviculturist ; Working Plans Officers ; President, Forest Research Institute, Dehra Dun } in print.